VOL. X. JUNE, 1897. No. 37.

JOURNAL

OF THE

United States Cavalry

ASSOCIATION.

PUBLISHED QUARTERLY
BY THE UNITED STATES CAVALRY ASSOCIATION,
FORT LEAVENWORTH, KANSAS.

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UNITED STATES CAVALRY ASSOCIATION.

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SABER AND REVOLVER.*

By Lieutenant WILLIAM H. SMITH, Tenth Cavalry.

THE title, "Saber and Revolver," is used intentionally, for while much has been written on these weapons by officers of our service, the subject has usually been the "Saber or Revolver," and the effort has been to prove that one or the other was unnecessary, and as a matter of fact a large class of our officers so believe.

The present paper will be devoted to an attempt to show that each weapon has a distinct and separate sphere within which it is supreme, or, at least, superior to the other; and that, consequently, both are necessary components of the armament of our troopers.

The sphere of each weapon is, for the saber, all mounted actions in which any considerable body of troops is employed; and for the revolver, all mounted actions of a minor character, such as the combats of hostile patrols, mounted skirmishers in pushing a retreating enemy or in covering a retreat, by the points and flanking patrols in all advance and rear-guard work, and by vedettes on outpost.

That the saber or sword is an effective weapon for cavalry when employed in masses history abundantly proves; it only remains then to show that the revolver is less so.

*Essay deemed worthy of greatest excellence at the U. S. Infantry and Cavalry School, 1897. Recommended for publication by the School Staff.

Unfortunately, no war has as yet given us a fair practical test of the relative merits of the two weapons when employed by considerable bodies of opposing cavalry; hence, any arguments on the subject must be based more or less on theoretical grounds. However, there is one principle involved which admits of historical demonstration, and that is, that the longer the range of the weapon employed, the longer the range at which the force using it endeavors to fight. This desire to fight at the length of the range of their weapon seems to be instinctive with the mass of men and exceedingly difficult, if not impossible, to overcome permanently by training, and even if accomplished temporarily, the slightest relaxation in discipline results in a reversion to the original tendency.

The history of modern wars shows how rare is the shock action of infantry. If one side gets up sufficient nerve to attempt the use of the bayonet, the other side usually retreats before the actual collision occurs. On the contrary, the history of ancient wars, when the opposing footmen were armed with the spear and sword, shows that the battles were usually decided by hand-to-hand conflicts. Shock action in those times had to be actual and not simply threatened, as now, to be effectual. Are, then, modern soldiers degenerate sons of noble sires that a threatened hand-to-hand conflict is sufficient to drive them from the field? Or is our discipline inferior to that of our so-called barbarian ancestors? Or is the tendency to avoid hand-to-hand conflicts due to the range of our weapons?

Is it logical to place a revolver in the hand of a cavalryman, teach him to believe that with it he can disable his enemy at a distance of a hundred yards or more, and then expect him to charge boldly into the midst of his enemies armed with a weapon whose range he is taught to believe is only one and a half yards? Would not the tendency, of men thus armed and taught, to check up to open fire when arriving within the range of their weapon, be irresistible?

The charging speed of a well trained body of cavalry on favorable ground would rarely be less than at the rate of twenty miles an hour. If the opposing cavalry were equally good, the two bodies, for the few seconds just preceding the collision, would approach each other at the rate of forty miles an hour or at about twenty yards per second, that is, the two bodies would collide in about five seconds from the time they arrived within one hundred yards of each other. Supposing the two bodies approaching each other in this way when the success or not of the shock depends so

largely on the relative speed and cohesion at the moment of collision, will not anything that tends to cause a checking up or hesitancy on either side be fatal to its success? It is evident that there will be a loss of effectiveness in the shock; will there not be a loss of morals also? It is a common saying that he who hesitates is lost. Is it possible to conceive of any combination of circumstances to which this saying is more applicable than to the supreme moment of a cavalry charge?

The revolver advocates, however, may say that there need be no hesitation or checking up on their side, but to this it may be replied that human nature and history do not seem to support their claim.

Another serious objection to the use of the revolver when charging in mass, lies in the fact that the officers cannot lead. Let us suppose two bodies of opposing cavalry arriving within charging distance. On one side, the officers are well to the front, waving their sabers and calling to their men to come on; on the other side, the charge sounds from the rear, no officers are in front to show the way; only the enemy is there, and he seems to be a solid wall of straining horses and flashing sabers coming on with the speed of the wind. Will not the men of the last named side have to be naturally braver than their opponents to meet them in equal shock?

But it may be maintained that even admitting there is a checking up to deliver fire by the side using revolvers, that any decrease in the effect of the shock due to this cause is more than balanced by the loss inflicted on the enemy. To this it may be replied that contests of this nature are not determined so much by the loss inflicted as by the moral effect on the survivors. But as any considerable percentage of loss in a short space of time invariably carries with it a great moral effect, it is well to examine this aspect of the case as closely as attainable data will permit.

Annual instruction in pistol practice has been carried on by all troops of our cavalry for about ten years. This instruction has been supplemented and stimulated to a certain extent for a number of years by department competitions. While the degree of success in pistol shooting attained by each troop may have been influenced somewhat by the opinions of its officers respecting the value of the accomplishment, still there has been less variation in the results than in carbine shooting, and it can hardly be maintained that more thorough instruction could be given to troops raised or recruited on the outbreak of war.

There have been no reliable experiments whatever, so far as the

writer is aware, of massed firing against massed targets such as would actually occur in the charging of masses of cavalry in war, hence, in the absence of such data, the only way of arriving at an approximate effect of the revolver when so used is to take the individual effect as a standard of comparison, and in view of the many elements favoring the trooper at individual practice and hampering him at mass practice, it is believed that the results so obtained would be above rather than below the actual facts.

While it is impracticable to make a thorough examination and comparison of the records made by each troop during the last few years, or since definite methods of instruction have been evolved and generally practiced, it is believed, taking into consideration the mounted firing only, that forty per cent. would be above rather than below the general average. It is an admitted fact that firing to the front is by great odds the most difficult and least effective direction, probably under the old practice of firing at targets representing men standing not over one-tenth of the effect in other directions, or 4 per cent., but if we consider the target as represented by the man and horse combined, the sectional area of the target would be doubled, and therefore doubling the percentage we have 8 per cent. as representing the effect at individual practice of firing to the front.

As to the percentage of target practice which can be counted on in war the different authorities vary all the way from $1\frac{4}{10}$ per cent. to 10 per cent. Supposing that with the revolver the percentage may be as great as ten, and taking 10 per cent. of 8 per cent. we have $\frac{8}{10}$ per cent. That is, out of every thousand shots fired there would probably be eight hits.

Let us suppose two bodies of opposing cavalry, of 1,000 men each, deployed in line and just arriving at 100 yards distance from each other, and moving at the charging gait; that one side uses the revolver, and that each man is expert enough to fire five shots in five seconds with the estimated battle effect; that the other side uses the saber and charges in the regulation way. At the instant of collision the side using the revolver has fired 5,000 shots and made forty hits. How many of these hits would be fatal enough to put the men or horses hit immediately out of action is largely a matter of chance, but certainly with the revolver now in use the number would rarely exceed one-fourth, and certainly not over one-half, of the number hit. Therefore, at the moment of collision we would have 1,000 men with empty revolvers and checked momentum

receiving the superior shock of at least 980 men with loaded sabers. Would the contest be long in doubt?

However, for the sake of illustration, let us carry the supposition a little further. Let us suppose the side using the revolver has been able to withstand the shock of their opponents, and at the commencement of the ensuing mêlée that each man has succeeded in reloading his empty revolver or in drawing a fresh one. We would then have a crowd of about 2,000 men in a space about 1,000 yards long by perhaps fifty yards wide. Within this space the indescribable confusion resulting from the clash and intermixing of opposing bodies of cavalry reigns supreme; half of the crowd are cutting and thrusting at their opponents with their sabers, but their blows fall only on the bodies of their enemies; the other half of the crowd are popping away at their opponents with their revolvers, but does anyone believe that the bullets take effect only on the bodies of their enemies? As a matter of probabilities, would not the chances be about equal of hitting a friend as often as a foe? Even suppose that the ideal of the revolver enthusiast has been realized and that each man on their side is an "expert"—capable of hitting his enemy at every shot—does anyone suppose that each shot is going to stop in the body of an enemy! As a matter of fact, would not every glancing shot, as well as many of those that struck squarely, pass through the bodies of those for whom intended, and in their after flight, would they not as often find their billet in a friend as a foe? Even under the ideal conditions of the revolver enthusiast, it would seem expedient to pray not only "Good Lord, deliver us from our enemies," but also "Good Lord, deliver us from our friends."

There is one phase of the subject of the use of revolvers in connection with the employment of cavalry in masses that has never been discussed or advocated, at least not within the knowledge of the writer, but which to him seems to be of considerable importance. Nearly all authorities, in discussing the use of ground scouts, seem to contemplate using them for purposes of exploration and warning only, and for fighting purposes to rally them on bodies in close order. It would seem that these men could use the revolver to the greatest advantage. If instead of rallying on the attacking line when coming within charging distance of the enemy, these men should penetrate through the intervals and around the flanks of the enemy's line, shooting his officers and creating as much confusion as possible as they went, then proceeding on to his supports and reserves, picking off the officers, especially those of the higher grades, it would seem that great confusion and damage would result.

Let us conceive for an instant of the predicament of say a brigade commander trying to supervise the combat and direct the action of his supporting and reserve bodies, with a dozen or more of these ground scouts galloping around him and popping away at him with their revolvers, shooting his orderly officers on their way to deliver orders, etc.; in short, creating annoyance and confusion in the enemy's ranks during the crisis of the combat. They would certainly restrict the observation and control of superior officers by compelling them to remain close under the shelter of their own troops; and it would require more than their own number to drive the ground scouts off.

This use of ground scouts may be considered by some to be in conflict with the instructions of such eminent authorities as FREDERICK THE GREAT and VON SCHMIDT, but it is believed that a careful consideration of the principles laid down by these authorities will convince anyone that if there is any conflict, it is only apparent and not real. FREDERICK authorized his squadron commanders to saber any *eclaireur* met riding at random across the front; and VON SCHMIDT says that just before the shock the *eclaireur* must clear the front, making for the flanks of the squadron or of the enemy, the evident intention of both authorities being to prevent these men getting in the way of the charging line and creating confusion. As stated before, the writer would have these men penetrate through the gaps or around the flanks of the opposing line, and if both of these ways should happen to be impracticable, then each ground scout must endeavor to make a gap in the enemy's line for himself, and the writer would advocate employing only such men as ground scouts who could be counted on to make such an attempt.

The writer would advocate the selection of men as ground scouts for their daring, horsemanship and proficiency in snap shooting, as well as for their intelligence and aptness in the duty of exploration. He would have them mounted on the fleetest and most manageable horses of the troop, and arm them, in addition to the saber and carbine, with at least two revolvers, and would give them every opportunity and encouragement to perfect themselves in snap shooting. When the troop was acting in close order, he would put them in the line of file closers; when on advance or rear-guard duty, he would use them as points or flankers; and when on outpost work, for patrolling. When circumstances permitted, he would allow them special privileges, and would endeavor to make their position one of honor and distinction, so as to be sought by the best men of the troop. No matter what the casualties might be on

service, there would be plenty of candidates for the vacancies, provided the position were made one of honor and distinction.

Another important use of the revolver in connection with cavalry in close order, is in the use of it by mounted skirmishers in pushing the retreat of a defeated enemy, while close order bodies in rear watch for a favorable opportunity to charge. It is also evident that the same tactics might be employed in covering a retreat. The revolver could also be used effectively by a line of foragers in charging a battery. It is probable that if the foragers once penetrated the line of guns, that they could do more damage with their revolvers by shooting the horses and cannoneers than they could with their sabers, as the cannoneers would probably take refuge under the guns and carriages, and thus be out of reach of the saber, while the horses would be difficult to disable with them.

In each of these cases, however, bodies of cavalry in close order should be at hand to clinch with shock action whenever opportunity offered any success gained by the skirmishers or foragers, and it is intended that these mounted skirmishers or foragers should be used only when the ground or circumstances render either mounted shock or dismounted fire action inexpedient.

In the past, charging bodies of cavalry have frequently been forced to draw up almost face to face with their enemy by an impassable obstacle. It is evident that under similar circumstances the revolver could be used with effect even by bodies in close order.

So far the effort has been made to show that the revolver is not a suitable cavalry weapon for close order fighting; however, its uses in connection therewith are believed to be of sufficient importance to justify its retention as a part of the armament of our cavalry, even if there were not other equally, if not more, important reasons for so doing.

An effort will now be made to show that the minor actions of cavalry are peculiarly adapted to the use of the revolver.

The saying of NAPOLEON that two Mamelukes could easily defeat three Frenchmen, but that one hundred Frenchmen had nothing to fear from an equal number of Mamelukes, and that one thousand Frenchmen could defeat fifteen hundred Mamelukes would seem to fairly cover the case of the saber against the revolver. Success or defeat in the minor actions of cavalry depends largely on the skill and bravery of the individual combatants, while that of large actions depends principally on the skill of the leaders and the united action of the mass, the individual prowess of the combatants being relatively of much less importance.

The revolver is essentially a weapon for individual combats; in these, there is usually plenty of ground for maneuvering and little probability of injuring friends when only intending to injure foes. Numerous examples might be cited from the memoirs of DE MARBOT, PARQUIN and DE SEGUR, where even the pistol of those days came off victorious in single combat over the saber, and from our own war of 1861–5 even more numerous instances might be mentioned, but the writer believes that very little difference of opinion exists as to the relative merits of the revolver and saber in individual combats where plenty of ground is available for maneuvering. The same conditions exist, however, in the combats of small patrols and actions of a like nature, and even to larger bodies until we reach a size when united shock action is more important than individual prowess, or for another reason, until we reach a size when the danger to friends from the use of the revolver is such as to render it less effective than the saber.

When this limit will be reached, depends a great deal on the character of the combat. It is evident that when two lines of skirmishers are opposing each other, that the revolver could be used without regard to the size of the force so long as there remained a well defined line of demarcation between them, but when the opposing forces are mingled together, the limit is very quickly reached, probably not exceeding a force of twenty combatants and certainly not over fifty.

The plan sometimes advocated of using the revolver while charging the enemy, and then just before the collision of dropping the revolver and drawing the saber, would not seem to have been well considered by its advocates, at least; every nation attempting a similar plan in war has quickly abandoned it, and it is believed that even a few experiments on the drill ground would convince anyone of its impracticability.

For the points and flankers of advance or rear guards, and for vedettes on outpost, the revolver is just as effective for giving the alarm as the carbine, and at the same time is much more convenient and safe to carry in a state of instant readiness. The revolver can be carried at the position of "lower pistol" for hours at a time and at all gaits without any apparent fatigue, while to carry the carbine at the "advance" is not only difficult at the faster gaits, but is also very fatiguing on the soldier even at the walk, and if occasion should suddenly arise for the use of either with the revolver the soldier can quickly and with more or less accuracy deliver five

or six shots; with the carbine, he can only deliver one shot quickly and with effect only when the muzzle is jammed against his opponent's body. It is believed that the carbine should be as carefully restricted to dismounted as the saber to the mounted action, except, of course, where no revolver is carried, it may be necessary to use the carbine mounted for signaling or giving the alarm.

In the foregoing discussion of the revolver and saber, the questions of calibre, methods of instruction in each, and other questions of a like nature have not been examined; these questions, while pertinent and important, cannot be discussed without exceeding the limits prescribed for this paper. But a few words in closing as to the length of time necessary to make a soldier fairly proficient in the use of each weapon may not be out of place because of the subject having a particular bearing on our own surroundings and conditions, where on the outbreak of war, our regular forces would have to be quickly recruited to a war strength and these forces largely supplemented by new organizations.

To use a saber effectively under the conditions of an average cavalry combat, the main things in addition to a good sharp saber and good horsemanship are a strong arm, a supple wrist and the courage to meet the enemy. The strong arm and supple wrist with the necessary amount of skill in fencing may be acquired by the average soldier in less than one month of daily practice of not over one hour per day. To remain in this condition requires a daily practice of about twenty minutes per day. This instruction may be given in garrison, in camp, in bivouac, or even on the march.

As to the amount of training necessary to make a soldier fairly efficient with the revolver, officers seem to differ considerably, but very few are willing to admit that with every facility of ranges, targets and ammunition, that a month is sufficient. Some of the difficulties in rapidly training newly organized forces on the outbreak of war in the use of the revolver would be in the obtaining of the large amount of ammunition necessary, and in the other necessary facilities for practice, such as ranges, targets, etc. Practice with ball cartridges outside of regular garrisons or camps of instruction would be difficult, and on the march or in bivouac impossible, except where small forces were congregated.

Under the pressure of war in getting men ready for service it would seem good policy, while endeavoring to get them all fairly proficient in the use of the revolver, to pick out those who show a special aptitude and give them extra opportunities for practice.

As to the length of time necessary to make an "expert" snap

shot with the revolver, it would seem that the span of human life is rarely long enough. The writer's search for one has been a good deal like the search of the wise men of old for a perfectly happy man. "Man never is, but always expects to be happy;" and it may be said of the revolver enthusiast, that he never is but always expects to be an "expert."

BALLOONS IN WAR.

By Lieutenant J. T. DICKMAN, Third U. S. Cavalry.

THE employment of balloons in war probably has many surprises in store for us. Balloons are classified as captive, free or dirigible.

Captive balloons are observatories which largely increase our view and the command of positions. They are a powerful aid in a campaign and also in a siege—especially for the besieged. New horizons arise as the elevation of the aërostat increases; objects in the vicinity seem to descend, whereas objects at a distance appear to ascend. Movements on the ground seem to become slower. At an elevation of 1,000 feet the observer has before him a magnificent topographical map upon which he can readily trace the smallest details. Moreover, photography enables us to correct the errors that observation with a glass might cause us to commit.

Free balloons have a double use: to force a line of investment, and to make reconnaissances above the enemy's position. For example, in the case of an invested city, if it be necessary to communicate with other parts of the country, a free balloon ascending by night would escape observation and be carried by currents of air to a great distance, probably beyond the theater of operations. In any event there would be a good chance for the aëronauts to reach friendly territory, from which they could communicate by telegraph or by rail; answer could be sent back to the besieged by means of the carrier pigeons brought along in the balloon for that purpose.

Dirigible balloons permit us to leave a place and to return to it after a simple reconnaissance or a long voyage. They partake of the advantages of both captive and free balloons, and are provided with a mechanism which gives them a proper velocity greater than that of the wind in ordinary cases.

The employment of balloons in war, which was proposed by a

Frenchman named MONGE, was approved in July, 1793, by a commission of savants who regulated the details. At the same time when a central establishment of aërostation was being organized at Chalais, a company of aëronauts was created, April 8, 1794. (Chalais is a town in the vicinity of Paris.) COUTELLE was its first captain.

The captive balloon was held by two ropes about 900 feet long, each of which was attached to the equator of the netting by means of a crow's foot widely spread out. It was transported by two detachments of men holding the ropes; this permitted the basket to oscillate freely. The continued movements of oscillation and balancing shook the unfortunate aëronauts terribly. Great activity and skill in the use of the telescope were required in order to make profitable observations. The balloon having been inflated, if it was intended to renew the ascent, was hauled down by winding the ropes on a windlass held down by heavy stakes. Hydrogen gas was produced by passing vapor of water over red-hot iron, according to the method invented by LAVOISIER. On the 2d of June, 1794, the "Enterprise," which was the name given to the balloon, was in Maubeuge giving valuable information about the forces and works of the enemy. As soon as the siege was raised the balloon was transported, inflated as it was, and in the midst of the greatest peril, into the camp under the walls of Charleroi. On the 21st of June captive ascents permitted inspection of the condition of the place, which surrendered on the 25th. During the battle of Fleurus, Adjutant-General MORLOT was in the basket with COUTELLE. MORLOT was enabled to furnish most useful information to his chief, General JOURDAN. On the 6th of July the "Enterprise" was torn by a storm.

A second company of aëronauts was created, and COUTELLE was made battalion commander of the two companies. These two companies followed the French armies into Germany without acquiring much distinction; nevertheless at Mannheim, Worms, and Ehrenbreitstein they rendered important service.

General HOCHE recommended disbandment of the companies in August, 1797. NAPOLEON took them along to Egypt, but the material was shipwrecked at Aboukir. They were finally suppressed in January, 1798, and with them disappeared the establishment at Chalais.

During the investments of Metz and Paris, 1870–71, free balloons served to carry dispatches and carrier pigeons.

The progress of meteorology, telegraphy, and, above all, the telephone, have opened new fields for military aërostation.

The shops at Chalais have been reopened. An aërostatic park was created by Captains RENAUD and KREBS. It was on trial in Tonquin on a reduced scale, on account of the lack of roads, and also at Bac-Nink in March, 1882, as well as in the operations which followed. Captive suspension secured constant orientation of the basket.

The complete regular park obtained a brilliant success at the maneuvers of 1886. The balloon was placed at 500 yards from the position of the general-in-chief. Reports were sent to the station on the ground by telephone, and thence by mounted orderlies to the general-in-chief. These reports always arrived twenty minutes before those transmitted by the cavalry.

The creators of the aërostatic park have been, and are now, ardently at work to solve the problem of the guidance of balloons. "La France" is the name of a dirigible balloon which attains a proper velocity of twenty feet per second. In five cases out of seven they have been able to bring the balloon back to the starting point. In order to arrive at a definite solution we must be able to attain a velocity of thirty feet per second, for, although the velocity of the wind, of course, varies exceedingly, statistics show that in three cases out of four it is below thirty feet per second (about twenty miles per hour).

The French naturally take the lead in these matters; other countries, however, have not been idle. During the War of the Rebellion LA MOUNTAIN used, near Washington, a captive balloon to reconnoiter the enemy; but, not finding his observations sufficient, he cut the cable, passed over the heads of the enemy, and finally descended in the State of Maryland. He then telegraphed the valuable information he had collected to MCCLELLAN. General FITZ JOHN PORTER made an ascension at Fair Oaks for the purpose of testing information sent out by the aëronaut. He had the balloon hauled down, ascended himself, and found the exact reverse of what had been reported to him to be true, as he had suspected. During the same war, also, the basket was for the first time put in communication with the ground by means of a wire running along the cable. This was done by Aëronaut ALLEN, who sent a dispatch to President LINCOLN, from the "Enterprise" hovering over Washington.

Several of our general officers made ascensions during the late war. General PORTER went to a good deal of trouble to familiarize

himself with balloon observation. General BUTTERFIELD and Captain CUSTER also made ascensions; the latter observed the evacuation of Yorktown.

The use of balloons in our service was discontinued after the battle of Chancellorsville. Captain GLASSFORD, Signal Corps, U. S. Army, in an exhaustive article on the use of balloons during the War of the Rebellion, published in the *Journal of the Military Service Institution* for March, 1896, attributes this to a large extent to the fact that there was at the time no means of rapid communication with the ground. The nature of the terrain, most of which was covered with forests, also interfered with observation.

It appears that one of the principal causes of inefficiency was the fact that the observers, who as a rule were members of the Aëronautical Corps, were not military men. They were, therefore, unable to interpret what they saw, and their reports were to a certain extent unreliable. During a battle the officers of the army, of course, were with the troops, so that at a time when information was most needed it could not be depended upon. Obstacles of the greatest military value were either not observed, or else not reported because their value was not appreciated.

At Fredericksburg General BUTTERFIELD, who had started on an ascension to settle an important question, was called down to take command of his corps and make an assault. He states that the short ascent he had made was of the greatest value to him in impressing the topography of the country on his mind.

The Confederates also made an attempt to use balloons. They experienced great difficulty in obtaining the necessary silk, an interesting account of which is given by General LONGSTREET.

Besides the direct value resulting from observation, balloons also had an indirect effect in interfering with work by the enemy on intrenchments, the existence of which he intended to keep secret. Construction was, of course, suspended and the men hidden while the balloon was making observations.

After a lapse of thirty years our government has acquired another balloon, which is in charge of the Signal Corps, thus utilizing the advantages which come from military knowledge, experience, organization, and discipline. The balloon, which is of goldbeater's skin, made several ascensions at Fort Riley, Kansas, several years ago, and was then removed to headquarters Department of Colorado for continuation of the experiments.

The Germans, after their fruitless effort before Strasburg in 1870, paid but little regard to this question until the decisive results of

the French maneuvers again attracted their attention. A school of aërostation was, however, established in 1884 under the direction of Major BUCHOLZ, and some ascensions were attempted at the maneuvers near Cologne. The ascensions were renewed at the siege of Mayence, in 1887. The Germans have especially occupied themselves with the means of combating balloons. They have also made experiments with luminous balloons, lighted by means of an interior electric light, to serve as signals, or to light up the ground to a great distance by means of an electric projector under it.

By this means a night attack could be executed, the enemy being in the light and the attacking party in the dark. We do not hear much from the Germans on the subject; it is not improbable that they are seriously experimenting with it.

Experiments in visual telegraphy have been the subject of deep study in Russia since 1384; the experiments were made by means of an arc regulator suspended under the balloon and connected with the ground by conductors.

The English have had since 1879 a company of military aëronauts and a workshop for the construction of captive balloons at Woolwich Arsenal. They derived a good deal of advantage from military aërostation during the Egyptian campaign of 1885.

The transport in the air of projectiles intended to fall upon the troops or fortifications of the enemy was tried by the Austrians at the siege of Verona in 1849. Two hundred small free balloons, each loaded with a bomb, and with match kindled, were let loose in the month of June. But, carried by contrary currents, the aërial flotilla came back to its point of departure, and the bombs exploded over the heads of the Austrians. They, however, got off with the scare.

All the European powers have to day a more or less considerable amount of material of military aërostation, generally copied after the French.

The material is organized by the French as follows: It is divided into three parts, namely: the fixed part, the movable part, and the part necessary for ascensions. The fixed portion is the park, which is composed of the following buildings: A hydrogen manufactory, a varnishing room, a house for the wagons, a shed for the inflated balloons, another for chemicals, a building for pumps, reservoirs of water and basins to receive sulphureted water. The hydrogen is manufactured from sulphuric acid and iron turnings, or chipped zinc. The acidulated water enters the bottom of the generator, traverses a column of iron turnings, and escapes, after ex-

haustion, by a waste way. The gas produced by the reaction ascends in the generator, and after being cooled in the washer, in which a strong current of cold water is circulating, passes through the dryer, which contains quicklime. The movable part comprises six wagons. They carry windlasses, rigging, hydrogen tubes, two steam engines, motors and dynamos for electric lighting. One of the wagons is used to transport balloons already inflated. The compressor carriage conveys a boiler, a steam engine with double cylinders, three double-acting pumps, which bring the hydrogen to a pressure of 200 atmospheres, a refrigerator and a purifier.

The tube carriages convey each eight vessels charged with hydrogen. With these tubes the inflation of a balloon is almost instantaneous on any part of the ground. The part for ascensions is composed of balloons, netting, cables, baskets, ballast, field glasses, maps, photographic apparatus, compasses, barometers, thermometers, telephones, call horns, etc.

Without going into the details of the material, we can see that it is quite an extensive outfit.

CAPTIVE BALLOONS.

The captive balloons are of three models:

1. The normal balloon, 530 cubic meters, can carry two men.
2. The auxiliary balloon, 260 cubic meters, carries only one man.
3. The gasometer, 60 cubic meters, is used for the partial reinflation of the other balloons, which will be necessary after a few days' use.

The balloons are of plain pongee silk coated with varnish, and have an opening at each pole, one for the valve, and one for the connecting hose. By means of the valve the balloon may be partially or completely emptied. The connecting hose is an apparatus of security, which acts in the same way as the escape valve of a steam engine; it forms a flap which allows the gas to escape when the interior pressure increases as the balloon ascends, but opposes the entrance of air. The netting is of cotton. The cables are of hemp, and contain the telephone wire imbedded in the strands.

FREE BALLOONS.

The free balloon has a capacity of 900 cubic meters. This increase of capacity permits a heavier load and a longer time of ascension, so that the aërostat will certainly pass the positions occupied

by the enemy. The duration of ascension is a function of the quantity of ballast that can be carried. A balloon has a constant tendency to come back to the ground. After it has reached the zone of equilibrium, radiation and the escape of gas through the material of the balloon diminish the lifting power. In order to make it rise again we throw out ballast. The balloon then swells out again on account of diminution of pressure, and does not stop in its ascent until it is completely full, at which moment the gas begins to escape at the lower orifice. It attains in this way a second zone of equilibrium, higher than the first, for the balloon is lighter. These phenomena of ascent and descent are reproduced without interruption during the whole course of a voyage. When there is no more ballast to throw out the balloon gradually comes to the ground. The free balloons are made of cotton.

It is difficult to obtain any information concerning the construction of the dirigible balloon. We know, however, that it is cigar-shaped, and carries a motor of light construction, which probably burns naptha. In a perfect calm it attains, as already stated, a velocity of twenty feet per second. Thirty feet is necessary to enable a balloon to return to its point of departure in about eighty per cent. of the cases arising. This is equivalent to twenty miles per hour. However, the anemometer would have to be consulted before starting, unless we were willing to take the chances of slower currents in the higher atmosphere. The director at Chalais is straining every nerve to bring the velocity up to the requirements. We, of course, do not know what direction these experiments are taking, but it is probable that lightness and increased power are being sought through the use of aluminum. Let us hope that Major RENARD will succeed in finding a practical solution of this grand problem laid down by MONTGOLFIER 110 years ago.

THE ATTACK OF BALLOONS.

The enemy has every interest in destroying engines of such great utility. We have to consider two cases: the attack of free, and of captive balloons. If the free balloons start at a suitable hour and travel at a sufficient altitude they are beyond all reach. The start ought generally to be made a very short time before daylight.

The Germans fired at the free balloons which cleared the walls of Paris. They even devised a small gun which was attached to a carriage and intended to follow balloons rapidly. The results were

almost nothing. But, if free balloons can avoid the enemy's projectiles by observing certain precautions, it is not so with captive balloons, whose elevation is necessarily limited. Numerous experiments by the English, Germans and French, show that projectiles of infantry and artillery do not seriously damage aërostatic material. The balloon may be pierced, and it descends; but the fall is neither rapid nor dangerous. The aëronauts, if not themselves reached by the projectiles of the enemy, will probably arrive at the ground safe and sound. As the regulation of the aim would not take a long time, we must not unduly prolong our stay in the air. Photographic reconnaissance should take the place of reconnaissance with telescope and sketching materials. An ordinary photographic apparatus with a focal distance from eight to twelve inches sees everything that the human eye itself could see, and nearly in the same way and with the same apparent dimensions. The sensitive plate has a considerable advantage over the eye in that it preserves a complete and ineffaceable image of the smallest details of the objective perceived. It affords the most valuable means of studying afterwards details which have escaped the eye of the observer or have disappeared from his memory. The useful range of aërostatic photography cannot exceed about a mile and a half; that is, the observer ought to be able to approach within a mile and a half of the details he may desire to fix.

The captive balloon being a constant object of aim for the enemy's artillery, and even for his infantry, reconnaissances from a balloon during sieges ought to be exceedingly rapid. Instantaneous photography helps to reduce the duration of ascensions to a minimum. Special captive balloons without passengers, furnished with photographic chambers operating automatically as soon as the aërostat attains a given height, have been operated in England since 1884, and give most satisfactory results.

But the application of the system of aëronautic photography to all kinds of balloons presents certain difficulties which practice has not yet been able to overcome. The result has been the same with an apparatus which the operator, remaining on the ground, puts in motion by means of electricity.

Aërostatic photography *with* an operator has made such progress that the instantaneous plates obtained from a balloon are as fine and clear as the plates of the same kind made on the ground. Since 1887, Major Fribourg, charged with the photographic department of the geographic survey of the French army, has obtained in two free voyages and in some captive ascensions a large number of very

clear and complete plates. The application of aërostation to photography is entirely of French origin. Photography from a free balloon constitutes the simplest and most complete means of reconnaissance for a besieging army. The besieged use the captive balloons.

A very interesting article by Professor BACHE, of the Coast Survey, on Photogrammetry was recently published. The author makes excellent suggestions as to the processes to be adopted in surveying by means of balloon photography. His method seems to be a combination of surface and aërial surveying; that is, certain distances are measured on the ground, and the balloon does the sketching, as it were. It must be remembered that a photograph represents objects as they appear, not as they are, and that only the objects orthographically below the instrument will be accurately represented on the plane of projection.

The dirigible balloon will be the surest and most convenient auxiliary of instantaneous photography. It will enable the army *in the field* to make photographic reconnaissances of the ground, and of the enemy in the positions he occupies.

LUMINOUS BALLOONS.

The besieged ought to have at their disposal the means of lighting up the field of fire during the night, for the enemy will probably endeavor to take advantage of darkness to open trenches and establish batteries, as well as to execute the most important movements of men and material.

The projectors of Colonel MANGIN have been recognized as superior to luminous balloons. The projector is a sort of cylindrical box about a yard in diameter, with a parabolic mirror at the back. Light is furnished by a voltaic arc between two carbons. The apparatus is placed upon a carriage mounted upon spindles; the mode of suspension permits it to turn in all directions. A second carriage bears a dynamo operated by a steam engine.

Summing up in conclusion, the employment of balloons in war constitutes a novelty, all of the results of which cannot be estimated or foreseen. The balloon of COUTELLE was nothing more than an observatory overlooking the field of action, but was subject to such violent oscillations as to render observation difficult. This, together with the difficulty of transportation and inflation, caused the directory to abandon it.

The captive balloon, with the aid of the telephone, gives infor-

mation necessary to the conduct of a battle more rapidly than mounted messengers. Instantaneous photography has given new precision to reconnaissances made by direct observation, and has corrected the latter by permitting the subsequent study of details. The range and precision of cannon having increased enormously, balloon reconnaissances during sieges must be made rapidly, and on account of the danger to aëronauts it would be desirable if panoramic photographs could be taken by an apparatus working automatically, or set in motion by electricity from the ground.

Free balloons serve to force lines of investment, and to make reconnaissances above positions of the enemy.

Luminous balloons, considered with reference to visual telegraphy and illumination of the field of fire, have not given satisfactory results in telegraphy, and are recognized as inferior to the MANGIN projector for the other purpose.

The definite conquest of the realms of the air, as well as that of the interior waters of the ocean, will probably render the close of our century illustrious. It is difficult to foresee the effect of the dirigible balloon in war upon land and of the submarine boat upon naval warfare. Will the balloon only be a photographic observer and a messenger, or will it carry fire and death in its basket? Shall we see two balloons charge each other, and will aërial navies struggle until one of them sinks in a shipwreck of death? Will the navigation of the higher regions fold the two worlds in a new embrace? Will it open the way to other COLUMBUSES, who desire to plant their flags at the Poles, and thus deprive the earth of its last secrets? Is not the submarine boat destined to plant its torpedo in the side of the ironclad, as the norwhal plunges his sword in the flank of the whale? Will it be a messenger forcing the blockade of ports? A champion dashing into the depths of ocean for new fields of combat? The future holds in reserve these two great secrets which the French have partially solved with the balloon "La France" and the submarine boat "Gymnotus."

THE FOURTH CAVALRY IN THE YOSEMITE NATIONAL PARK.

By Lieutenant N. F. McCLURE, Fifth Cavalry.

ONE of the most important steps which has been taken by our government in the direction of preserving the forests with which nature has so bountifully provided this country was the passage of the act, approved October 1, 1890, setting aside the Sequoia, General Grant and Yosemite National Parks, all in the State of California, and all now under military control. The area of these is 2,024 square miles.

The Yosemite Park comprises forty-two townships of the Mount Diablo base line series, a total of over 1,500 square miles. This tract is nearly rectangular in shape and is thirty-six miles wide, by an average of forty-two miles in length. The geographical center lies about twenty-eight miles nearly southeast of the intersection of the 120th degree of longitude west, with the 38th parallel of latitude north.

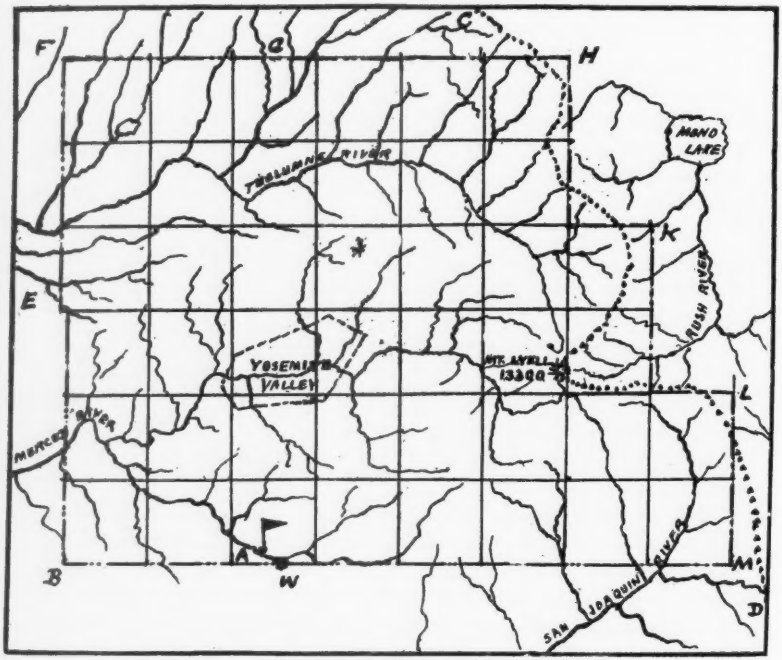
Near the center, and having an area of about fifty square miles, is the Yosemite Valley proper. It belongs to California, it having been presented to that State by the United States, in 1866.

The Interior Department had already learned the value of soldiers in policing the reservations, and a guard for the three parks was soon asked for. Captain A. E. Wood became the first "Acting Superintendent" of the Yosemite Park and arrived, with his Troop "I," Fourth Cavalry, early in May, 1891, at Wawona, on the southern boundary of the reservation. There were many serious difficulties encountered and those who knew Captain Wood before his death will realize that the right man for the place had been selected. Possessed of an indomitable will and an exhaustless supply of energy, efficient, fearless and firm, he soon became the terror of the law-breakers.

These were included in five classes, viz: Miners, hunters, campers, ranchmen and sheep men. The miners gave the least trouble of any, their trespassing being confined to the locating of new mines, to which they could never procure a title, and the killing of an occasional deer or bear.

The hunters committed great depredations on the game, and it was very difficult to prevent this, as they came in during the winter while the troops were absent. At the time the reservation was set aside they had almost destroyed the game of that region, but, under the fostering care of the military, it is now on the increase.

Campers defaced many natural objects and, through carelessness or wantonness, caused many fires. Where they obeyed the regula-



THE YOSEMITE NATIONAL PARK.

A—Camp A. E. Wood. *W*—Wawona.
CD—Main chain of the Sierra Nevada.

AB—30 miles. *AE*—47 miles. *AF*—75 miles. *AG*—80 miles.	By usual routes.	*AH*—70 miles. *AK*—56 miles. *AL*—66 miles. *AM*—65 miles.	By usual routes.

tions they were generally treated with every courtesy and consideration and were not considered trespassers.

The same may be said of the ranchmen. These comprised the settlers who, either legally or by squatting, had taken up land within the Park limits before it was set aside. Such men generally owned some small place and grazed their cattle and other stock on the public land within a radius of several miles about their respective cabins. To determine who were bona fide settlers and to make them keep their stock within their own fences was one of the hardest problems which confronted the new superintendent.

The fifth class of trespassers, the sheep men, committed more depredations than all the others put together. They knew the country thoroughly and, as there were no reliable maps of the Park at first, they were often able to elude the detachments sent after them. When once caught they take their medicine with good grace, since they belong to a class against whom every man's hand is raised, and seem to realize that they have no legal right to drive their flocks over the great public domain. They are usually Portuguese of the most ignorant class and often do not own the sheep which they have in charge. All grass, flowers, shrubs and young trees are destroyed by their bands, and they often start disastrous fires in order to burn off the heavy undergrowth which impedes the progress of their flocks. Such were some of the men with whom Captain Wood had to deal upon his arrival.

The first summer was necessarily devoted mainly to "learning the ropes." Some work was done and a few bands of sheep were run out; but not much could be accomplished until the best camp site was selected, the ranches located, the real settlers separated from the squatters, the country partially explored and the boundaries approximately determined. The region was one of unusual ruggedness, and the learning of the trails, fords and passes was an extremely difficult task.

A temporary camp was located one-half mile north of the southern boundary of the Park and one mile northwest of Wawona, Cal., on the south fork of the Merced River. This camp afterwards became permanent for the following reasons: It was the nearest point that could be obtained, forty-three miles away. The climate was pleasant during the greater part of the season, the elevation being only 4,000 feet. Fresh beef could be procured at Wawona, and forage and other supplies could be delivered there at reasonable rates. It was also on the main line of travel of tourists and campers visiting the Yosemite Valley. The objections were, that

there was but little grazing and that the camp was not centrally located. The latter fact greatly multiplied the labor of patrolling, since it was forty to seventy-five miles to the points along the borders where depredations were usually committed. A glance at the rough sketch accompanying this article will show this disadvantage very plainly.

The Park is divided into four great water-sheds, that of the Tuolumne River, that of the Merced, that of the San Joaquin and its branches and that of the Rush River. These streams all start from the vicinity of Mt. Lyell, 13,300 feet, and they and their tributaries cut the reservation up into a series of rough cañons and ridges over which scouting is extremely difficult, it being usually necessary to carry supplies by pack mules. The lines of travel may be classed into 190 miles of roads, 680 miles of trails and 400 miles of cross-country routes—a total of about 1,270 miles. Half of this should be patrolled every two weeks. Add to this the riding and the foot-scouting that ought to be done at the sides of these routes, and some idea can be obtained of the enormity of the task to be performed. Yet, during the first five years, only one troop of cavalry, with one ambulance, two escort wagons and ten pack mules was sent for this purpose. This force was, of course, inadequate, but it rendered a good account of itself.

Owing to the rather severe winters and the fact that no stables or barracks have ever been built at Wawona, the troops return to the Presidio of San Francisco early in each season. This is unfortunate, as during the absence of the military the poachers swarm in and destroy much game, the weather not being cold enough to keep them out.

In May, 1892, Captain Wood arrived for his second tour of duty, and everything having been gotten in running order the summer before, he now opened a vigorous campaign against violators of the Park regulations. Here another difficulty confronted him. Trespassers could be removed, but there was no penalty attached to their evil doing. They could and often did return to their depredations as soon as released at the Park boundary. To partially overcome this, the act of removal was often made as inconvenient as possible to the offender. For example, a man caught in the southeastern part of the reservation might be ejected at the northwestern corner, at a distance of 125 miles from the point of capture. But this method of procedure was productive of much extra work and guard duty for the captors, and was not used to any great extent except when some old offender was to be taught a lesson.

Nothing was done to remedy this trouble until quite recently, when the act, published in General Order No. 15, A. G. O., March 15, 1897, came into effect. This gives the "Acting Superintendent" considerable power, and the only drawback in its working will be the time and expense of getting law-breakers before the proper courts.

Captain WOOD was a third time in charge of the Park in 1893, and he began the work of stocking the lakes and streams with fish. He died on April 14, 1894, and was succeeded by Captain G. H. G. GALE, who, with his Troop "C," Fourth Cavalry, arrived at Wawona on May 24, 1894. His first official act was to name the camp "A. E. Wood," in honor of the gallant soldier who had so long occupied it. Captain GALE soon recognized the necessity for a good map of the Park. Soldiers who knew the terraine from previous scouting could go anywhere, but new men coming in were almost at sea without guides in the many rugged cañons of the northern and eastern parts of the reservation.

The new superintendent at once set to work to remedy this. The Park was divided into several sections and hektograph maps of these, in outline, were made. Each officer and non-commissioned officer in charge of a detachment had one of these, covering the region into which he was sent, and upon which he made corrections and filled in new details. It took but a short time to discover that the existing maps were unreliable in almost every particular. After returning to the Presidio in November, 1894, the author of this article compiled, under Captain GALE's direction, a fairly good map of the reservation, but as he was unable to visit all points in one summer, this work was still far from what it should have been. The result was, that when Captain RODGERS with his Troop "K," Fourth Cavalry, was sent to Wawona in May, 1895, the author accompanied him with a view to revising the map. Captain RODGERS afforded every facility in his power towards accomplishing this end, and Lieutenants BENSON and SMEDBERG, Fourth Cavalry, gave a hearty coöperation in the work. The second map was completed in March, 1896, and has been found to be of valuable assistance during the past season. It will probably answer all purposes until a survey, which is much needed, can be made.

It was not until 1895 that the full magnitude of the labor of properly policing the Park was realized, and adequate steps taken to systematize the work. The full benefit of the experience and mistakes of previous years was then reaped for the first time. Trails now run to every nook and corner of the reservation, and, though some of them are rough and others even dangerous for horses

and mules, still a few hundred dollars spent in improving them would greatly simplify the matter of patrolling. Since the establishment of the Park one of the principal aims seems to have been to avoid spending a cent of money on its improvement. No work has been done on trails except such as could be done by detachments passing over them from time to time; no barracks have been constructed; no stables built; no surveys made; and, until recently, no laws enacted to enforce regulations.

Against all these and many other difficulties that little band of cavalry has labored each year faithfully, intelligently and efficiently. Witness these words, spoken by Prof. JOHN MUIR before the Sierra Club in San Francisco, November 23, 1895:

"When I had last seen the Yosemite National Park region, the face of the landscape in general was broken and wasted, like a beautiful human countenance destroyed by some dreadful disease. * * * This year, I am happy to say, I found these blessed flowers blooming again in all the fineness of their wildness, * * * nearly every trace of the sad sheep years of repression and destruction having vanished. Blessings on UNCLE SAM'S blue-coats! In what we may call homeopathic doses, the quiet, orderly soldiers have done this fine job, without any apparent friction or weak noise, in the still, calm way that the United States troops do their duty. UNCLE SAM has only to say, 'There is your duty,' and it is done. * * * A very suggestive flock, not of sheep but of shepherds and their dogs, were seen this summer crossing the Yosemite National Park. Nine Portuguese shepherds and eighteen shepherd dogs were marched across the Park from the extreme northern boundary, across the Tuolumne Cañon and the rugged topography of the Merced Basin, to the southern boundary at Wawona, and presented as prisoners before Captain RODGERS, who had charge of the troop guarding the Park. These shepherds submitted to being driven along over hill and dale day after day as peacefully as sheep, notwithstanding they had a little previously been boasting of their fighting qualities and the surprising excellence of their guns. * * But when they were calmly confronted by a soldier, armed with the authority of the United States and a gun of much surer fire than theirs, they always behaved well and became suddenly unbelligerent. Occasionally a flock would be found in some remote, hidden valley of the Park, attended by three or four shepherds, so that a watch could be kept on the movements of the soldiers from the heights around the camp. But sooner or later they would be caught and made to obey the laws, for every year the whole Park is faithfully policed.

"In my wanderings I met small squads of mounted soldiers in all kinds of out of the way places, fording roaring boulder-choked streams, crossing rugged cañons, ever alert and watchful; and knowing as we do the extreme roughness of the topography of the

Park in general, our thanks are due these quiet soldiers for unweariedly facing and overcoming every difficulty in the way of duty; and always it is refreshing to know that in our changeful government there is one arm that is permanent and ever to be depended on."

These are glowing words, but they are well merited. The non-commissioned officers and privates are entitled to their share of them, too. It is on them that the brunt of the work has fallen. It is they who have lived in camp six months of each year without any but the most meagre comforts; who have subsisted on bacon and beans, rather than break regulations, even though game was plenty all about them; who have made many lonely bivouacs in the rain and snow, without tents or other cover; who have with great labor ascended high peaks to look for the dust of moving bands of sheep; who have led their horses down into rugged cañons, thousands of feet deep, only to lead them out again on the other side; who have fought the awful forest fires; and lastly, who have spent many weary nights of guard duty over captives whom they were, on the coming day, to watch and drive to the next night's camp. Let these devoted men have the full credit for their faithful and arduous services.

In May, 1896, Colonel S. B. M. YOUNG, with Troops "B" and "K," Fourth Cavalry, arrived at Wawona. Colonel YOUNG had early determined on a rigid enforcing of the rules, and having with him two troops, fully equipped with wagons and pack-mules, he was enabled to carry out his intentions. One of the troops had been there the year before and knew the region thoroughly; hence, there was no lack of good guides. In addition to the main camp, a sub-post was also established near the western boundary on the Big Oak Flat road, which is the main highway leading into the Park from the west. In previous years the smallness of the force at Wawona had not admitted of this disposition. By this arrangement Colonel YOUNG was enabled to do away with a considerable portion of the patrolling in the western part and concentrate his energies in the more mountainous regions. His policy was much the same as that of his predecessors, except that he came a little earlier and stayed considerable later (November 24th). He thought that troops should arrive even earlier than the middle of May. He was in favor of building bridges over the large streams at important points. Heretofore the high water had often interfered with detachments getting over. Desperate chances were sometimes taken, as for example, in one instance, when an officer took eight

horses and three mules in safety over a large sheep log which spanned a mountain torrent forty feet in width and extremely rapid.

Colonel YOUNG was strongly opposed to any reduction in the size of the Park; he recommended that a survey of it be made; he asked that legislation be enacted to impose penalties on violators of the law; and he gave all the assistance in his power to the distribution of trout to the waters of the reservation. During his tour over 400,000 small fry were sent out from the hatchery at Wawona. This hatchery was established by the State in 1895 and was under Mr. A. G. FLETCHER of the Fish Commission the first year. He devoted all his time and energy to making it a success. It was built by WASHBURN BROTHERS, the proprietors of the Yosemite Stage and Turnpike Company. Their coöperation with Mr. FLETCHER and the assistance of the troops have combined to make the work accomplished in this line very satisfactory.

The following is a general outline of the method of policing the Park. Most of the work was done by patrols, consisting of from five to ten men, usually, though not always, under the command of an officer. One of the soldiers in each detachment was generally able to tack on a shoe if one were lost. Their orders are to drive out and scatter all sheep, to arrest all herders, to disarm all campers and tourists, to take in charge all persons found hunting or fishing without permits, to see that all ranchmen have their stock within their own fences, to repair bridges and trails where needed, to escort stock of cattlemen to and from land of theirs within the Park limits, to arrest all persons caught defacing any natural objects, and to extinguish forest fires. The last of these is one of the most difficult of all. The fires occur every year in the latter part of July with such regularity as to lead some to suppose that they are due to natural causes. Be this as it may, they are formidable enemies to subdue when they once get well started in the thick carpet of the pine needles, trash and leaves which cover the ground on which these forests stand. Fires may break out at other times than in July, but they can almost always be traced to some carelessness. For those soldiers in camp drill is kept up right along at the rate of at least one hour per day. Another duty which consumed the time of the troops was target practice, which has taken place every year but one. The time generally selected was August and September. The range was a level, treeless meadow, about fifteen miles north of the main camp and at an elevation of 7,800 feet. In the vicinity are thousands of acres of succulent grass. The horses were

always taken up when the shooting began and were herded each day over these beautiful pastures. Pistol practice completed the list of duties.

This article would be incomplete without a brief description of the great center of attraction of the Park—the Yosemite Valley. This is one of the grandest wonders of the world. Its uniqueness consists in the great number of objects of natural scenery collected in a comparatively small space. The entire valley and its surrounding cliffs comprises but little more than a township, and yet in this limited area lie over fifty places of interest, any one of which is well worth a journey of a thousand miles to see, and all of which can be visited within a week. Lakes, rapids, thundering waterfalls, great fissures in the earth's surface, bald granite domes, mighty cliffs of over 3,000 feet altitude, all are here united, forming one vast whole, the like of which can be seen nowhere else in the world. No objects of scenery can excel the Yosemite Falls, Bridal Veil Falls and Illilouette Falls when at their best. None can compare with the Half Dome, Cathedral Spires, El Capitan, Nevada Falls and Glacier Point. But grand as all this is, there are other spots that can almost equal it in the Sierra Nevada, rising to the east and north many thousands of feet above the Valley. Among these may be mentioned the Devil's Post Pile, the Great Slide, the Grand Cañon of the Tuolumne, Hetch Hetchy Valley (a miniature Yosemite), hundreds of lakes, thousands of peaks, cliffs, glaciers and cañons. Many of the mountains rise to heights of 13,000 feet, Mt. Lyell 13,300, being the highest on the reservation. The region is one of great ruggedness. The greater part of the Park lies above an altitude of 6,000 feet, and over half is above 8,000 feet. Small glaciers lie at the foot of the large peaks. Timber runs up to 11,500 feet. Above that is grass for another 1,000; then snow and rocks. When traveling with animals no forage is needed. There is grazing almost everywhere above altitudes of 5,000 feet. Beautiful meadows lie hidden among the forests and extend up the mountain sides far above the timber line; thousands of streams come trickling down from the snowbanks and glaciers, and swelling as they unite, go tumbling over beds of boulders on their way to the sea.

It is the cavalryman's paradise—food and drink for his horse everywhere. Though the cold of spring and autumn may be biting, though the life may be lonely, though the work may be difficult—still, happy is the soldier whose lines fall amid these scenes of grandeur and sublimity, where nature has put forth her mightiest efforts.

THE LAST FIGHT OF THE SIOUX WAR OF 1867–77.

By Lieutenant JOHN F. McBLAIN, Ninth Cavalry.

THE winter of 1876, following the Custer massacre, witnessed unusual military activity on the Yellowstone. General N. A. Miles, then colonel of the Fifth Infantry, was placed in command of the forces left in that section of country when the greater part of the troops that had been busy during the summer campaign were withdrawn for the winter.

General Miles's command consisted of his own regiment and part of the Twenty-second Infantry, under Major Elwell S. Otis.

The hostile Sioux that had broken up into numerous small bands and scattered all over the country immediately after the Little Big Horn fight, and had by reason of doing so eluded the vigorous pursuit made by Generals Terry and Crook, had a merry time of it in keeping out of the way of General Miles, who chased and followed them back and forth across the Yellowstone about a dozen times, keeping them constantly on the move, giving them no rest until they found it to their advantage to go into the agencies and live off the bountiful provision made for them by our merciful and forgiving government.

Aside from those hostiles that had crossed the line into British territory, the only ones known to be out was a small camp of about three hundred, made up of the discontented of nearly all the hostile tribes.

To drive in or to catch and punish this band, General Miles organized a campaign in the spring of 1877. The troops engaged in this duty were four troops of the Second Cavalry, being the same squadron that Custer declined to take with him on his march up the Rosebud to his death the summer before, believing his own twelve troops strong enough, four companies of the Twenty-Second Infantry and one company of the Fifth Infantry as train guard.

On May 1st the command left the Cantonment at the mouth of Tongue River and marched up that river until on the 4th, about noon, the column was halted and preparations were made for dinner. Just about the time it was prepared orders were passed along to hurry and get the packs ready; we were going to leave the wagons, as information had been brought in by the scouts that precluded the possibility of taking wheels. It didn't take us long to get the "packs" ready, as they were to carry nothing but ammunition and rations.

The march was resumed across to the Rosebud, almost at right angles to the direction in which we had been marching. We crossed the Rosebud a little before sunset and continued the march all night, and the sun of the next day was well up in the heavens before we halted for a short rest and breakfast.

During the night we had passed over quite a raise in the hills west of the Rosebud, known by the Indians as "The Big Hill." At times it seemed that we could hear the rushing of water a long distance below us, and that a misstep by a horse would hurry his rider into the unknown. This hill was crossed at night as a precaution against being seen by any of the hostiles that might be out hunting in the hills.

The command was guided by half-breed "JOHNNY" BROURIER and "HUMP," a Cheyenne warrior; they knew their business and were determined to keep their promise to General MILES, to place his command on top of the hostile camp without the Indians knowing it.

All day May 5th we marched through the hills west of the Rosebud, passing camp after camp of the hostiles. Many of them presented evidences of having been recently occupied, these evidences being fresher with each succeeding camp. May 6th was nearly all spent the same way; we knew that we were getting closer and closer to our quarry; it didn't need the warnings and assurances of our scouts to enlighten us; the deserted camps spoke only too plainly of our proximity to the hostiles.

The camps gave no signs of hurried departure, which fact bespoke either an ignorance on the part of the enemy of our near presence or a confidence and willingness to meet us, when and where they thought best. We felt satisfied that our nearness was unknown to them even if they were aware of troops being out after them.

About 2 o'clock on the afternoon of the 6th the column was halted, messages were sent to the subordinate commanders which soon caused them to gather with the General at the head of the

column. In a short time orders were given for the cavalry to take two days rations in their saddle pockets, and each troop to take one pack mule with two thousand rounds of ammunition, the infantry to remain with the pack train and follow the trail of the cavalry as speedily as prudent.

The cavalry cut loose from the infantry at a good stiff jog, keeping it up until about 8 o'clock, when it went into bivouac in a "pocket"; strict and positive orders were given against striking matches or making a light of any kind.

The General called his officers together and informed them that the hostile camp had been definitely located and that he intended to "jump" it at daybreak next morning; to do this it would be necessary for the troops to be in the saddle about midnight, and directions were given to that effect; the plan of the coming fight was outlined and dispositions made, contingent upon the Indians standing and fighting. At midnight the command was quickly and quietly aroused, each and every man keenly alive to the importance of making no noise that might be carried on the midnight air to the enemy and give the alarm.

It needed but a few minutes for the troops that had been campaigning in the Sioux country for several years past to get into shape and form column. As soon as everything had been reported up, the column started at a good sharp trot and kept it up for about twenty miles, when we swung down out of the hills into the valley of the Rosebud. It was one of the most exhilerating experiences I ever had; all nature seemed awake and appeared to have put on newer and fresher charms to greet us and speed us on our way.

It was not until we were about to turn into the valley of Muddy Creek that rein was drawn; the hostile camp was then but a few miles ahead of us. To be ready for any emergency a brief halt was made to adjust saddles and tighten girths. Troop "H," Lieutenant L. H. JEROME commanding, was in advance, and was told off to take the herd; in this he was to be assisted by Lieutenant ED. CASEY, Twenty-second Infantry. Troops "F," Captain TYLER, and "G," Captain WHEELAN, were to compose the fighting line, while Troop "L," Captain NORWOOD, was in support.

How we did go galloping up that valley, now troop front, now in column of fours, the changes in formation made necessary by the windings of the stream. The camp was struck at about 4 o'clock on the morning of May 7th; every man in the command seemed to partake of the spirit of the General in whom they had so much

confidence, and felt that upon the result of this fight depended whether or not the Sioux would remain "good."

The hostiles disappointed General MILES somewhat, as they did not wait to fight for their "homes and firesides" but took to the hills. The General was equal to the change of conditions; he quickly turned the leading troop (TYLER'S) up a "draw" to the right; pushed the next troop (WHEELAN'S) through the village to a corresponding position on the other side of a hill facing the village; NORWOOD'S troop was quickly deployed, dismounted and advanced through the village and up the hill. Upon this hill the Indians had massed and NORWOOD would never have gotten up if TYLER had not first been in position to get in a cross fire and thus occupy the attention of at least a part of the Indians; the hill was so steep that it was as much as the men could do to creep up it without having to fight at the same time.

As soon as the camp had been attacked General MILES had it made known to the hostiles that they could surrender and be properly taken care of. LAME DEER and IRON STAR, the two head men of the camp, seemed desirous of taking advantage of this offer, and approached to within a few yards of General MILES. LAME DEER placed his gun on the ground as an earnest of his good intentions, and IRON STAR seemed about to follow his example, when one of the citizen scouts near the General fired at the Indian; immediately IRON STAR fired at the group with the General, and LAME DEER, grasping his gun, stepped back about five yards, and taking deliberate aim fired directly at the General. How the bullet missed the one it was fired at is one of those mysterious things that happen in all battles. The Indian was not more than ten yards from General MILES when he fired, and the bullet hit a soldier of "H" Troop, who was in line with the General, behind him, in the breast, killing him instantly.

The audacity of the move and the suddenness with which it took place, coupled with concern for the General's welfare, so occupied the attention of those with the General, that the two chiefs made good their retreat to the hills, only to die there. Although "F" Troop was pouring into them a heavy fire, the Indians fought stubbornly, and it was no easy task for "L" Troop to get a foothold on the hill, but it succeeded in doing so, and LAME DEER was killed within a few minutes thereafter. IRON STAR saw that his comrade had received his death wound and tried, in the face of a hot and continuous fire, to drag him away, but the troops were pressing them too closely, and he was obliged to abandon his friend, though

he did it reluctantly. The trend of the hills was off in the direction of where "G" Troop was, and as the Indians followed them, they were brought right under the fire of that troop, and IRON STAR was killed there, within thirty yards of the place he had to leave his chief.

From that time until the hostiles finally got down into the valley of the Rosebud, the fight was a running one, the Indians making stands at every place presenting good opportunities of checking the advance of the troops, to cover the retreat of their families.

JEROME and CASEY "jumped" the herd and captured it. The boys whose province it was to put the horses out to graze had just done so and were returning to camp, when the troops were upon them. Had we been ten minutes earlier or ten minutes later in attacking the camp, we would not have been so successful in getting the herd; as it was, the Indians got away with not more than a dozen horses. The captured herd consisted of about 600 head of fine horses, and were used to mount the Fifth Infantry.

The infantry reached us about noon.

Many times during the day a few Indians would appear upon some one of the many hills around the camp, and after firing a couple of volleys into us, would scamper off. Fortunately, there was but one of these volleys that did any harm. A soldier of "H" Troop was engaged in frying some meat, having his frying pan over the fire, when a bullet shattered his arm, making him drop his pan, which he did with the exclamation: "D—n it, there goes my bacon."

During the night the camp was protected by a chain of sentinels entirely encircling it, and an almost incessant firing was kept up from dark to daylight, which had its influence in deterring the Indians from making a break through the camp to stampede the herd, for it is very probable that had they found a part of the line not responsive to their challenge of fire, that part would have been visited in force.

The valley was narrow, with high commanding hills on either side. The Indians in numbers were covering those behind us, watching our every movement, and it required good judgment to get the command out of the valley down into the broader one of the Rosebud, with the large herd of captured horses, without serious trouble, and it had to be done by "backing out." The Indians were ready to take advantage of mistakes and to pounce upon us, but the opportunity longed for did not present itself.

This was the last of the fights in that long series incident to the Sioux War. The defeat of the Indians was most complete. Every-

thing they owned, aside from what little they had on, was abandoned in the wild rush for the hills when they heard the near approach of the troops. It removed forever from their minds the erroneous impression that they were superior fighters to the troops. Their entire camp was destroyed, together with large stores of dried meat, and all at the expense of four soldiers killed and one officer and five soldiers wounded.

SCOUTING IN ARIZONA, 1890.

By Lieutenant JAMES W. WATSON, Tenth Cavalry.

IN March, 1890, a Mormon freighter was murdered by Apache Indians on the road between San Carlos and Fort Thomas in Arizona. Detachments were sent out from these posts to apprehend the murderers. After riding most of the night the two detachments met about sunrise near the scene of the murder. The detachment from Fort Thomas was under Lieutenant CLARKE of the Tenth Cavalry, with Tenth Cavalry soldiers of his own troop; and the one from San Carlos was under Lieutenant WATSON of the same regiment, and consisted of Indian scouts and Fourth Cavalry soldiers. CLARKE was a typical cavalry officer, an expert rider, who could do anything with a horse, energetic, dashing, bold to the point of utter recklessness, and fond of field service. Chief among the scouts and most faithful of them all, and one of the ablest and pluckiest, was ROWDY, then a sergeant. He was young in years—only about twenty-eight then—but old in Indian war, and loved campaigning and fighting and killing even better than he loved whiskey. He was very much loved, and also feared, by his brother scouts, and had great influence over them. Among the Fourth Cavalrymen was Sergeant DANIELS, a Texan, who had been a cowboy. A braver, cooler and more genuine cavalryman than Sergeant DANIELS never rode a horse.

The trail of the murderers was soon found, taken up, and followed by the united forces. The murderers had taken with them the two large horses of the dead freighter, and their large tracks aided the scouts very much in following the trail, which led up the bare, rugged sides of the Gila range of mountains. Sunset found us about fifty miles on the trail, which was going in a northwestern direction.

The day's work had given us some important information.

We found from the trail there were five of the murderers; we found also that the murder was not one of those sporadic ones so common then among the Apaches, resulting from a tizwin drunk, but it was simply the first act of a regular outbreak. The party was a regular war party, who had renounced their allegiance to all constituted authority and had gone on the warpath. The freighter happened to be the first white man they had run across so far, and they had simply killed him on general principles and in accordance with the code of the warpath. It was supposed, when we left our posts, to be merely the result of a tizwin drunk and that we would find the murderers somewhere about their camps. For this reason, we had only one day's rations with us. But our information put a new aspect on affairs. We were now on the beginning of a trail that would probably lead all over Arizona and New Mexico and into Old Mexico. We had only half rations for the next day. The question of rations, however, did not cut much of a figure, as we would most likely get near some military post and could send in. In the meantime there were plenty of cattle in the valleys and deer in the mountains, and the trail would, no doubt, lead into some ranch where the hostiles would go to get fresh horses.

The prospects of a spring campaign were viewed with pleasure. CLARKE was overjoyed to get in the field again. The soldiers were delighted to get out of drill and fatigue duty. After supper the scouts lit their cigarettes and, gathering around their camp fire, discussed the situation. ROWDY, on such occasions, was a most interesting and entertaining talker to his brother scouts, as would be shown by their faces; now grave and fierce; now convulsed with laughter. On this occasion he told them how it was most likely we would get down into Mexico and how we would probably have a fight with the Mexicans, who had put him in jail once in Captain CRAWFORD'S time. The scouts were much interested, for they all had old scores to settle with the Mexicans. The abundance of mescal (Mexican whiskey) down there and the ease in getting it was no doubt another attraction Mexico had for them. Indeed, Mexico had a peculiar fascination and attraction for all scouts and many cavalrymen. There was something to appeal to all temperaments and dispositions down there. It was a foreign country, full of novel and interesting sights for an American. There was mescal in abundance. There were all kinds of gambling games; and scouts were great gamblers. There was always a first-class show for a fight with the Mexican irregular troops. So the prospects of a long ride over Arizona and New Mexico and probably into Old Mexico

were hailed with delight, and the fact of having no rations in no way dampened the feeling of exultation.

A scout or a cavalryman of the Plains is never more at home than on the wide prairies or in the rough mountains of that country. It is his element, his home. He is very likely to get lost or "rattled" in a large city, and perhaps not find his way back to his hotel at night, but he will never get lost or rattled on plain or mountain. As long as his horse and carbine are in good condition, he feels at ease under all circumstances. The boundless, pathless plain, and the rough and rugged mountains, peak after peak and range after range—it is all his loved and special domain; and the young cavalry officer with a good command of trusty Indian scouts, or scouts and soldiers, and a roving commission over this vast country, feels that he is monarch of all he surveys.

"These are our realms—no limits to their sway;
Ours the wild life in tumult still to range
From toil to rest, and joy in every change.
Oh, who can tell? Not thou, luxurious slave!
Not thou, vain lord of wantonness and ease!
Whom slumber soothes not—pleasure cannot please.
Oh, who can tell, save he whose heart hath tried,
The exulting sense—the pulse's maddening play
That thrills the wanderer of that trackless way?
That for itself can woo the approaching fight,
And turn what some deem danger to delight;
That seeks what cravens shun with more than zeal,
And where the feeble faint -- can only feel—
Feel—to the rising bosom's inmost core,
Its hope awaken and its spirit soar?"

At daylight next morning we were in the saddle and trotting along the trail. It was plainly making for the rough country in the Sierra Ancha mountains. Towards noon one or two recruits, who in some way got in the detail, began to play out. They were utilized to send into San Carlos, then about thirty miles distant, for rations. By figuring on the time it would take them to get in and where the trail would take us by that time, and then figuring again on where the trail would take us the next day, and the time it would take rations to get out—a kind of indeterminate equation, to speak mathematically—it was possible to fix on a place where rations could be sent to meet us without our having to wait for them. We knew the country well, and could figure very closely on the way the trail would have to go. It took us within two miles of the place designated, which we reached a little before sunset next day; the rations, however, had not arrived. Here we got our

first meal for the day, having killed a beef and having obtained about half rations of coffee and salt from a ranchman who lived near. Just as we were pulling out, about sunrise next morning, Sergeant CHEATHAM, of the Tenth Cavalry, with a small detachment, emerged from a little side cañon and fell in in our rear with the much desired rations, just in the nick of time, not even a halt being made. He had left San Carlos at 11 o'clock the night before and had made a night march to this point of forty-five miles. The last half of this was over a mountain trail, a hard road to travel at night. The old fellow looked very tired and worn as he rode up, but his indomitable nerve and pluck carried him on forty-five miles more this day—a continuous ride of ninety miles from 11 o'clock at night to sunset next day.

The country this day was of the roughest description. The trail led up and down rocky mountain ridges not far from perpendicular, where it was extremely difficult to lead the horses—for we had to lead them nearly all day—and the poor animals would become rattled and seemed to gaze with piteous and pleading eyes at their leaders, as if imploring not to be forced over such a fearful country. It was a day that tested hearts and lungs to the uttermost, and if anyone had been along with a weak heart or lungs that day he would surely have succumbed.

In the afternoon we got down to the bottom of Salt River Cañon, which here presents the striking and awe-inspiring features of the Grand Cañon of the Colorado. The hostiles had here got into a place so rough they could not use their horses any more, and in accordance with the customs of the warpath had killed the poor animals that had carried them so far. From here on the trail was on foot, which made it much more difficult to follow. For several hours it was lost entirely. The scouts became disheartened and discouraged, and would sit down or lie down and rest instead of looking for the trail. Appeal had to be made to their sensibilities. ROWDY was fond of notoriety, and he was told how all the papers would talk of him if we captured the hostiles; how he would be praised for his good work, even in Washington; how all the people in Arizona would know of him and thank him; and last, but not least, of the large reward, in money, the scouts would get if the murderers were caught. The appeal had the desired effect, and they went to work again with a will, getting down on their "all fours" and working along like so many fox-hounds. At last, after three or four hours of slow, patient work, the trail was picked up

on the banks of the river, in the sand, and we slept on it again that night down in the somber depths of the Salt River Cañon.

At dawn next day ROWDY, with the best trailers among the scouts, took up the trail on foot, for, after the hostiles got on foot, horses could follow it no longer. Indeed, few soldiers or white men could go where the scouts had to go. The remainder of the detachment, with all the animals, had to work their way around as best they could to where the cañon opened out, about fifteen miles below. This point was reached about 1 o'clock, and the scouts, whom we had not seen since they left in the morning, had not yet arrived. They were somewhere in the rough country behind us that we had gone around. We were watering our horses in the river, when suddenly the distant echoes of a rifle shot were heard in the mountains behind us, then another, then another. It meant the scouts had come up with the hostiles. Next was seen the dim outline of a human figure on top of a high ridge a mile or so distant waving his arms. It did not take long to get to the top of the ridge. After a short dash over brush and boulders the horses were left at the foot of the ridge, and everyone clambered on foot up the steep and rocky sides. Sergeant DANIELS was the first man on top. The waving figure was ROWDY. He was already in fighting costume, that is, entirely naked except his breech-clout. The other scouts hurriedly got themselves in the same savage but warlike dress, taking off even their moccasins, so their feet would have firmer hold on the rocks, and tieing their long hair back behind their heads to keep their eyesight always clear.

Dispositions were soon made for the approaching fight. The result was to put the hostiles' position in the center of an equilateral triangle and a group of about seven soldiers or scouts at each vertex. So arranged, the fire from each group into the hostiles would pass between the other two groups. If the hostiles should make a break to get out they would have to pass between two groups and be exposed to their fire as well as the fire from the third group. The hostiles were hidden away in a clump of rocks and bushes about one hundred yards from each group. There was no possibility of their escape. The main problem was to get all of them without losing any of our men, all of whom were securely sheltered behind rocks. The far-reaching voice of a scout was used to call down to the hostiles, telling them they could see for themselves there was no possibility of escape, and if any of them wished to surrender they would be allowed to do so. The leader called back, "If you want us come down and get us," and added some uncomplimentary

remarks about the Agent. The order was given to "commence firing," and very soon three converging showers of bullets were pouring into the hostile position. The hostiles immediately returned the fire and, at first, their puffs of smoke came with vigor and rapidity, but soon slackened down and came only at intervals. The whole field of action was filled with whizzing and zipping bullets which, hitting the rocks, would glance off in all directions. The "whiz" of the bullets was more sharply distinct than the report of the carbines. No one was in sight. Only the puffs of smoke showed where the firing came from. The hot fire of the three groups was raising a cloud of dust, leaves and broken fragments of rock about the hostile position; the mountains and hills around reverberated with the rapid reports of the carbines; and the whole valley became filled with the smoke and every variety of "whiz" from the flying bullets. A French general said of the charge of the Light Brigade at Balaklava, "It is magnificent, but it is not war." So all this smoke and din and whizzing of bullets was a very fine sight, and magnificent, too, on a small scale, but neither was it war, because it was not bringing us any results in the shape of dead hostiles. The fire that would break out from them now and then showed they were still as much alive as ever. It was necessary to draw the lines closer around them. Two of the groups united and worked up under cover of the rocks or any kind of shelter to within fifty yards of the hostile position. We were fighting Apaches, and we fought them according to their own tactics. Their cardinal principal is, "Kill as many of your enemies as you can, but don't be such a fool as to get killed yourself." All we could see were the puffs of smoke from their position. So all they could see of us were puffs of smoke; and we had the great advantage of being able to move around, while they could not.

Our new position did not help us much. The closest scrutiny did not reveal the least glimpse of a hostile. After some random firing from this position a small party of about ten scouts and soldiers, including CLARKE and ROWDY, taking advantage of all cover, made a rush which took them right among the rocks of the hostile position. Here was a large rock, or boulder, approximately about the size of a frieght box car, but of a rough and irregular shape. We were on one side of this rock and the hostiles were on the other and not more than forty feet distant. CLARKE, who was always ahead in dangerous places, was the first to clamber up this rock and peep over on the other side. After looking around for some time he got a glimpse of a patch of red skin. Two shots fired

at this patch of red skin did not cause any kind of movement, from which it was concluded the hostile was already dead. And so it was found afterwards. A bullet had entered his right eye and gone through his head. He had been killed by one of the hundreds of bullets, in the act of firing, no doubt, as was indicated by the position of his rifle. ROWDY, who had got on top of the large rock discovered another patch of red skin which he made out to be an arm. He fired at this and in return three bullets spattered against the rock close to his head. ROWDY peeped over again and this time he made out the left side of the same hostile. He aimed with great deliberation and the shot brought several bullets in return, but soon groans were heard from the wounded hostile. ROWDY, as he squirted a mouthful of tobacco juice over the rock, remarked, "I guess I got that feller that time." But the wounded Apache was game. He was discovered again through the foliage and rocks; this time a small part of his leg showed just above the knee. Another bullet struck him, about six inches above the knee, shattering the bones of his leg. The nervy fellow, wounded to death as he was, roused up enough strength to send back several bullets in rapid succession which spattered against the rock near our heads. The last bullet had, however, given him his mortal wound and ended the fight. He called up to us that he could not fight any more, and said he had told the others to surrender, as their case was hopeless. He was chief of the band. The others soon came out of their hiding places and surrendered. One was wounded in the arm. One was found dead, as previously mentioned. The chief, a handsome young fellow, was shot in the left arm, had two ribs broken on his left side—ROWDY's two shots—and the bones of his right thigh were shattered into fragments. We tried to carry him back to camp—an extremely difficult undertaking over such rough country, and it was then about dusk. ROWDY, who was always very practical in all matters, remarked, "I don't think we'll ever get that feller up that hill; I think we better kill him." The poor fellow was suffering the most intense agony, and begged us to kill him. Even in these supreme moments he would break out now and then into snatches of an old Apache war song. We did all we could for him, but to no purpose. Death soon put an end to his sufferings. None of the hostiles escaped. Our success was complete, and was owing mainly to the good work of the scouts in trailing, and, above all, to the bull-dog tenacity and faithfulness of ROWDY. None of us were injured, which was due to the fact that we used the hostiles' own tactics against them.

ROWDY got everything that was promised him that fearfully tiresome day down in Salt River Cañon. He got a medal from Congress. He and the other scouts got the reward from the Governor of Arizona. He made hosts of friends in Arizona. And, what pleased him probably more than anything else, he got his name in every paper in Arizona and New Mexico. ROWDY was an original and interesting character. He had some virtues of a high order and many vices. He was unswervingly faithful to his friends and terribly faithless to all others.

He would kill a wounded prisoner to save the trouble of getting him to camp, but would cry like a child on saying good-bye to a friend.

THE HORSE'S FOOT.

By M. J. TREACY, Veterinary Surgeon, Eighth Cavalry.

UNTIL recent times veterinary literature has been remarkably barren on all subjects excepting the foot and shoeing. It was natural, perhaps, that these subjects should excite considerable interest, considering their vast importance. The first thing which strikes the observer is the remarkably small size of the equine foot in proportion to that of the body. Comparing the horse's foot, so far as size is concerned, with our own, the advantage lies in the majority of cases on the side of the biped. The most interesting fact which physiology demonstrates is, that though the equine foot presents a small circumference, in reality it encloses a vast area, due to the anatomical arrangement of its part. The amount of moisture contained in the horn of the foot is somewhat considerable, and the rate at which it evaporates is quite extraordinary.

If portions of the frog be enclosed in a bottle, in a short time the interior becomes bedewed with moisture. The use of this moisture is to keep the hoof elastic and prevent it from becoming brittle, and the agencies which are at work to assist this are a coating over the wall of a thin, varnish-like layer of horn, which can be seen in the unmutilated foot, and in the case of the sole and frog, by the layers of exfoliating material which accumulates, as the result of shedding the superficial layers. Those all *prevent evaporation and should be preserved.*

We are bound to recognize that horn containing but little moisture is in an abnormal condition; it is ragged and brittle; nails driven into it cause it to crack; and that elasticity on which so largely depends the natural shape and usefulness of the foot becomes impaired and destroyed. A museum specimen of the hoof will clearly illustrate our meaning. In its dried condition it is so brittle that if dropped it will fracture like a piece of glass. Place this foot

in water for a few days and it comes out as fresh and elastic as though it had just been removed from the foot of the owner, instead of being an old museum specimen. All this horn has done is to imbibe water, which has entered its minute canals by capillary attraction, and the brittle substance now becomes yielding and elastic. We can now see how important elasticity is to the hoof, and when we consider that a horse trotting has to pound the earth with sledge-hammer like blows, and therefore the dreadful series of concussive shocks to which the foot is exposed during work would inevitably lead to its destruction by fracture or otherwise unless this wise provision existed. Clinically, we are aware that fractures do occur in the hoof from violence.

Let the advocates of small steel plates or light shoes remember that moderately heavy shoes radiate or destroy those dreadful concussive shocks to a very great extent; this is particularly well known to practical horsemen, who will invariably apply heavy, wide-webbed shoes to horses slightly tender in their feet; and in my opinion all saddle horses ought to be shod in front with shoes of not less than thirteen or fourteen ounces in weight, properly distributed, for above reason.

No man in his senses will undertake a long walking tour over rough country in his dancing pumps.

The objects to be attained in shoeing are: 1st. To protect the hoof from wear and tear, incident to travel; 2d. To radiate, moderate or destroy those dreadful successive concussive shocks of the foot against the ground which obtains in all its rapid gaits; the quicker the gait the greater the shock.

The removal of the varnish layer of the wall, and cutting across the horn fibres by the unnecessary use of the rasp, leads to considerable destruction; however, in the most brittle foot that portion of the horn nearest to the vascular structures still maintains its elasticity. The frog contains the greatest amount of moisture, the wall the least.

The hoof may be regarded as a duplicate structure, one being a complete counterpart of, and fitting into the other. The internal one is spoken of as "the sensitive foot," the external one "the horny foot." The physiological interest in "the sensitive foot" lies:

1st. In the arrangement of the blood vessels.

2d. Anti-concussive provisions.

3d. The means by which the enormous body weight is supported.

4th. The remarkable manner by which the area of the foot is increased, without adding to the surface.

These will be explained in turn:

1st. *Vascular Mechanism.*—Taking the blood vessel arrangement, we recognize that the enormous amount of blood sent to the foot is chiefly for the purpose of growing the needful amount of horn. There is hardly any part of the body so vascular; even the pedal bone is a highly rarefied structure, like so much pumice-stone, to afford passage and protection to the numerous blood vessels.

Lying as the foot does, furthest away from the circulatory center, added to which is its position at the lowermost part of the body, we are led to inquire, why it is that the blood is able to circulate through it so thoroughly, and if other means are at hand for assisting the force of the heart in facilitating the circulation. Such means we do know exist. The arterial blood pressure in the foot is high, for we have gravity assisting the heart's action, and powerful elastic walls to the vessels. But though the contraction of the left ventricle is sufficient to force back the blood to the right ventricle from any part of the body, it is doubtful whether this force would be wholly sufficient to empty the foot of venous blood and keep the considerable plexus of veins full.

This venous circulation is, however, assisted by two important movements in the foot, viz: the expansion and contraction of its posterior upper half, and the alternate descent and elevation of the pedal bone, under the pressure of the body.

There is no physiological point which probably has given rise to more controversy than the elasticity of the foot, but it is not only amply provided for but positively proved within recent years. Its provision exists in the elastic nature of horn, and the existence of the large elastic cartilages at the posterior and lateral parts of the foot, and also the important fact that though the internal parts of the foot are solid anteriorly, yet it is soft and yielding posteriorly.

The amount of movement occurring in the foot under the influence of body weight, increases with the velocity at which the horse may be traveling. It is small at a walk, and still less when he is made to throw his weight on one foot by lifting the opposite foot; even with this simple test, special and delicate instruments are capable of registering this movement and moreover of measuring it. There is no difficulty in seeing the movement imparted to a column of fluid circulating in those parts, for if we divide a plantar vein, and make the horse walk, each time the foot comes to the ground expansion occurs, and the jet of blood considerably increases, and

when the foot is taken off the ground the jet of blood is reduced. We must accept as a demonstrated fact, that this venous circulation is largely facilitated by the expansion and contraction of the posterior part of the foot. During expansion the blood is driven upward, and during contraction the relaxing veins aspirate the blood into their interior.

So perfect are those changes that there are no valves in the veins of the foot, and none are found until near the middle of the pastern. To assist the circulation, the large venous trunks at the posterior-lateral part of the foot are in close connection with the lateral cartilages, and some of them even pass through their substance. It will be understood from the above why want of exercise will cause swollen limbs in horses.

THE SENSITIVE LAMINÆ.

We have now to consider the means by which the weight of the body is supported within the foot. It is universally recognized that this is carried out by the union of the horny with the sensitive laminæ. That the enormous weight of the horse's body should be carried, or rather slung, upon these delicate slips of sensitive material on one hand, and corresponding slips of horn upon the other, is perhaps the most remarkable feature of the physiology of the horse's foot. We know how fine the union is; we know the extreme difficulty of separating these two parts, even by mechanical means, in a state of health, and we recognize the delicate structure of the parts yielding this firm yet flexible union.

The horse's weight is supported in the foot by the dovetailing of 500 or more sensitive laminæ, with 500 or more horny laminæ, this union being made more complete by each primary sensitive and horny lamina containing 100 or more secondary laminæ. The laminæ afford an immense surface of support which is longest at the toe, shorter at the quarter and shortest at the heel; but though the slinging surface is so much shorter at the quarters and heels, yet its strength is increased by the direction in which the body comes upon it. Instead of bearing the weight on the length of the laminæ, as at the toe, it bears on therewith in such a manner that where we had, say one lamina at the toe, there are twenty at the heel; in other words, the laminæ which are vertical at the toe become more oblique until they become almost horizontal at the heel. In front these laminæ are attached to the pedal bone, but laterally and posteriorally to the elastic cartilages; in other words, where expansion and contraction of the foot becomes greatest.

A horse's sole carries little, if any, weight. This has been experimentally proven over and over by removing that organ; its margin alone—that adjoining or in contact with the wall, assists in supporting the body weight, this latter being slung, as it were, on the laminæ by their attachment to the pedal bone and hoof respectively. When we remember the sole is concave, it will be clear it has some other function than that of weight-bearing to perform; its function is to protect the sensitive sole and pedal bone. The folding up of these horny and sensitive leaves in the foot in the manner described has another function besides that of merely supporting the body weight and rendering the union firm. It is clear that by folding up this amount of material the surface of the foot is enormously increased. In other words, by this arrangement the foot has been kept within small proportion without affecting its stability. A book of 500 pages may, by placing one leaf above another, be made to occupy a bulk represented by a few inches, but if each page be laid out separately on the ground and made to touch each other, the surface covered would be considerable. This is precisely what occurs in the horse's foot. The laminæ, by this singular arrangement, increases the foot surface and yet keeps it within reasonable bounds.

MOELLER has estimated that it is equivalent to eight square feet, while GAVES's estimate is eleven square feet. The bearing surface of each foot being equivalent to say eight square feet, thus affording a total area for the pedestals of thirty-two square feet. The physiological function of the leaves of the foot is demonstrated by pathological observation. Inflammation of these leaves (laminitis, or founder) occurs either from overwork or from the horse standing too long in one position; in either case they get strained and resent it. The practical value of exercise to horses, which for any reason have to remain idle, cannot be disputed, this exercise overcoming the tendency to congestion of the laminæ, from strain or gravitation. Previous to the advent of corrals being attached to each troop stable foundered horses were quite frequently seen. Now a case of laminitis is a rarity. Nevertheless, troop corrals did not come into existence without considerable opposition from the "non-progressives," like stall partitions, which are still to be seen in some troop stables, for no more logical reason but that our "great-grandfathers used them," for they create darkness, filth, non-ventilation, reduced vitality from vitiated air, and add very much to the labor of the stable orderlies, intefere with the inspection and grooming of the horses and drying of stall floors; and the contrast of stables with

and without stall partitions will appeal to common sense alone in favor of the latter. Horses in the field seem to get along very well in their absence. Of course, one or two stalls might be retained for vicious or restless animals, and their partitions ought to be liberally perforated with three inch auger holes from top to floor. I speak from long experience in stating that horses suffering from respiratory diseases recuperate very slowly when kept within stalls, partitions and on dirt floors, with the consequent gravitation of excretæ, etc., etc.

How the foul, stinking mass, thus generated, in which horses are compelled to stand, can result in the so-called benefit to their hoofs has always been to my mind a difficult problem to find a solution to. If hard, impermeable flooring is injurious to horses' hoofs then seventy-five per cent. of domesticated horses ought to suffer, but they do not, if the hoof is not mutilated in shoeing. I am a firm believer in dry, hard floors and surface drains; dirt floors are literally and practically dirty floors, and the cause of rheumatism, respiratory diseases, hoof troubles, thrush, canker, contraction, filth and vitiated atmosphere, etc., etc. If any doubt existed as to the function of the laminæ in supporting the weight of the horse's body we have only to refer to the process which obtains in them as the result of disease, laminitis being frequently followed by a separation of the horny from the sensitive laminæ, when the body weight not being properly supported, the pedal bone under the influence of this pressure is actually forced through the horny sole.

ANTI-CONCUSSIVE MECHANISM.

The arrangements which exist to save the foot from concussion are numerous. We have in the first instance the highly elastic and India rubber-like horny frog. Second, the fibro fatty or plantar cushion. Third, the elastic cartileges of the foot. Fourth, the elastic posterior wall. Fifth, the descent of the sensitive foot within its glove—the horny foot. The descent of the sensitive foot has been as strongly denied as the expansion of the posterior wall, but there exists no difficulty in demonstrating it. The fore foot comes to the ground flat or frog first. In the slower paces flat; the faster the gait the more apparent is the fact that the heels first touch the ground. The frog from its peculiar physical position, is not only adapted to prevent the horse from slipping and to give him ground grip, but also to save the entire limb from concussion. This is the reason why it comes instinctively to the ground first, as concussion to the anterior part of the foot is prevented by a slight up

and down movement betwixt the laminæ and the pedal bone, through the medium of the extensive layer of elastic tissue found at this point. As the weight comes on the foot the pedal bone slightly descends, to rise again when this weight is removed. As the pedal bone descends the sole on which it rests also slightly descends and comes nearer the ground, which is one reason why the horny sole is concave instead of flat. This descent avoids concussion in the same way that it is easier to catch a base ball with a retreating movement of the hand than by rigid opposition.

THE FROG.

The function of the horny frog and its peculiar physical features have already been alluded to. The manner in which it protects the important navicular bursa is also no insignificant part of its function. The soft and elastic condition of the horn of the frog has been attributed to certain perspiratory glands which are found in this region. How far they contribute to the elastic condition of the frog is not clear, especially as the surface over which they are distributed is of a very limited area. The frog is peculiar inasmuch as it needs for its perfect health contact with the ground, or in other words, to be level with the heels of the shoe or bare foot, as the case may be. Protrusion beyond those limits will result in injury to the structure above it; in fact, I have seen horses injured by sticking ignorantly to the theory, "Don't cut away the frog," by persons who should exercise more intelligence and common sense. As well might a nail protruding from a boot heel into the human foot be allowed to remain and cripple its owner. We know particularly that frog pressure is more or less essential to the healthy foot, and that many foot diseases are cured by its restoration alone, and that the sole will not tolerate ground contact for any continued length, especially on rough or hard roads.

"THE WALL."

From what we have previously said, it can be seen that it is on the wall of the hoof that the horse's weight is supported. On examining the horny wall we find that it is thickest at the toe, thinner at the quarter and thinnest at the heel. It is thickest at the toe owing to the great wear and tear to this part. As the frog is the first to touch the ground, so is the toe the last to leave it, and it is from this latter point that propulsion is given to the body. The toe wall seems to grow faster than the heel wall apparently, and it

is the tendency of the entire wall to grow forward and downward, thus continually producing an increasing obstacle to perfect equilibrium, which should be removed at no longer intervals than four or five weeks at farthest. Neglect of this operation is the cause of the great majority of diseases of the feet and limbs. The object of the wall of the fore feet becoming thinner as they proceed backwards, is to allow for expansion under body weight. For this reason nails should not be driven into the posterior half of the walls of the fore feet, but they can be driven with impunity from toe to heel of the hind feet, for the reason that the wall increases in thickness from toe to heel in the hind feet. Shoe manufacturers are well aware of this, and consequently punch the nail holes further backwards in hind shoes. Hind shoes are not desirable for fore feet on this account. When so used the posterior nail holes should not contain nails. Two physical conditions have to be provided for in the walls of the fore feet, viz: elasticity of the posterior half and toughness of the anterior portion. The posterior parts of the fore feet first receives the body weight, at least in the fast paces. The expansion of these parts save them from destruction under those circumstances, and the various anti-concussive provisions which exist are considerably assisted by the fact that the walls are thinner at the heels than elsewhere, and so yield outwards; but besides being thinner, the heel wall contains more moisture than the toe wall, and this ensures its elasticity. The younger the horn, viz: the nearer to the coronet the more moisture it contains; the further away from the coronet, or nearer the ground, the less moisture it holds, and consequently the more resisting and tougher it is at this part. The anterior part of the wall is longest vertically, therefore the toughest, because it is much older than the heel horn, contains less moisture, and is consequently harder, etc. The heel wall is some months younger than the toe wall and much thinner, therefore contains moisture, and consequently is more elastic and less tough. The age of the wall is therefore an important factor in the wear of the hoof. The horn of the quarter is older than that of the heels; that of the toe older than that of the quarter. This excellent provision against wear and tear admits of considerable friction where it is most required, viz: betwixt the ground and toe, and allows of the expansion of the younger and moister horn of the heels. The expansion of the heel wall is aided also by the elastic lateral cartilages, which bulge outwards each time the frog has ground contact. At the heels the walls are inflected inwards and forwards to form

the bars, which run for some distance under the foot towards the apex of the frog.

The bars are part of the wall and their function is the same, viz: to support weight and resist wear and tear. The elastic movements of the foot must now occupy our attention. The mechanism which brings this about has already been touched upon; it now remains to briefly describe the changes in shape which the foot undergoes as the result of body weight. When the weight comes on the foot it is received on its posterior part, viz: the heels, bars and frog. The elastic posterior wall is pressed outward by the frog being forced to expand laterally betwixt the ground and navicular bursa. The expansion can be plainly seen at the posterior part of the coronet, for at the moment of expansion the bulbs of the heel at the coronet, sink under the body weight and consequently come nearer the ground, and as a result of this the anterior coronary edge retracts and the pedal bone slightly descends through its elastic connection with the sensitive laminæ, pressing the sole down with it. Under those conditions the blood pressure in the veins of the foot rises and consequently the vessels are emptied. When the weight is removed from the foot these blood vessels fill, the frog retracts, the posterior walls contract and become narrower from side to side and the bulbs on the heel rise, at the same time the anterior edge of the coronet goes forward, the pedal bone and sole ascend.

LATERAL CARTILAGES.

We have dealt with certain functions of these bodies. Let us now summarize our knowledge of their uses:

1st. They form an elastic wall to the sensitive foot and afford attachment to the sensitive laminæ.

2d. As the foot increases in size these cartilages carry outward the sensitive laminæ which are attached to them and thus secure them from injurious pressure. Large venous trunks pass through and are in intimate connection with these elastic cartilages, and the movements of the latter assist in the circulation. The function of the lateral cartilages has light thrown upon it by disease, when they, through inflammation, become converted into bone, constituting that disease known as "side bones," thus destroying their elasticity and creating a very intractable form of lameness seen in cavalry horses.

NAVICULAR BURSA.

The pedal bone presents a remarkably small articulatory surface, much smaller than the bone which rests upon it. In order to increase the articular surface an additional bone here presents itself known as the navicular bone; by this means the corona rests on an articulation which is rigid anteriorly and flexible posteriorly. Under the yielding navicular bone passes the perforans tendon which solely supports it under body weight. The compression to which it is thus exposed by the weight from above and pressure of the tendon below is the principal factor in the causation of that very serious, common and intractable disease known as "navicular arthritis," or coffin joint lameness.

When the foot comes to the ground the body weight comes first on the flexible articulation of the pedal joint, viz: the navicular bone and its supporting tendon, the corona is then rotated in such a manner that the weight of the body is transferred to the pedal bone and through it to the sensitive laminæ.

Wherever we look we find the same provisions maintained for an elastic posterior and a rigid anterior part. Such are the physiological features of the equine foot which are eminently calculated to facilitate circulation and destroy concussion. It will be thus seen that it is not a crude block of insensitive matter, to be mutilated and injured at the sweet will of every ignoramus who assumes a knowledge of it (and it is simply a matter of astonishment to observe the confidence with which the average man will assert his superior knowledge of the horse and his diseases, and in fact attempt dictation on this subject to persons who have made it a lifetime study), but a most wonderfully constructed apparatus, possessed of qualities which are not found in any other part of the body or in any other animal.

In constructing the equine foot, nature seeks to do more than merely protect the extremely delicate and exquisitely sensitive structures contained within it from injurious contact with the ground. This redoubtable difficulty is comparatively insignificant in comparison with the other tasks assigned to it. It was necessary that the lower extremity of the equine limb should be an organ endowed with the acutest sense of touch for the instantaneous perception of the consistence and inequalities of the ground over which it moves; and whilst it possesses this quality in the highest degree, it is also indispensable that it should be gifted with the properties, apparently incompatible, of resistance, pliability and lightness to the extent necessary for the support and progression of the whole

body, in addition to the rapidity essential to the propulsion, the elasticity and suppleness needful to avert reactions and jars, and the durability and rapidity of renovation demanded by incessant wear and tear. Here we have a combination of requirements whose simultaneous existence in one organ might almost be deemed incompatible, so opposite do they appear, viz: insensibility with a delicate sense of touch, resistance with lightness, rigidity with elasticity, and suppleness with durability. Foot lameness is only too frequent, but if it were not for the various mechanisms we have attempted to describe, it would not be possible to work a horse one hour. It is no argument against hoof expansion that it is almost imperceptible, small as it is in the slower paces more particularly, yet it suffices to convert what would be a rigid, unyielding block into an elastic and yielding one, and at a gallop or rapid trot this expansion must be considerable, probably more than double what it was under the slow gaits.

The evils of shoeing can be as easily recognized as its necessity. By bearing in mind the functions of the various parts of the foot we can certainly reduce these evils to comparatively narrow limits, and in a few words we will state what constitutes physiological shoeing:

1st. The reduction of the wall to its proper proportions, such as would obtain through friction had no shoe been worn and the horse seeking his living, viz: reduce the shoe surface until the white line which connects the sole and wall is plainly visible from heel to toe.

2d. Fitting the shoe accurately to the outlines of the foot—not altering the latter to fit the shoe. Rasping the crust to fit the shoe not only renders the horn brittle, but is a direct loss of bearing surface; but abnormal conditions, such as crooked feet, long toes, etc., must be remedied by removal of portions of the wall.

3d. Leaving the wall intact, so far as the varnish layer is concerned; the practice of rasping the wall and under the nail clinches destroys the horn tubes and allows of so much evaporation from the surface of the horn, that the walls become brittle.

4th. The sole, except its shoe surface, not to be removed by knife or rasp. It cannot be too thick, being there for protective purposes; therefore the thicker and stronger it is, the better protection it affords to the structures above it.

5th. The bars not to be removed or interfered with except the shoe surface alone. They are part of the wall and intended to carry weight. The shoe should rest upon them.

6th. The frog to be uncut and allowed ground contact where possible. The frog cannot perform its functions unless on a level with the heels of the foot or shoe as the case may be. If it protrudes beyond these dimensions it should be lowered.

7th. The pattern of the shoe is immaterial, so long as it is true and level bearing and rests evenly on the wall, sole and bars and has sufficient weight to assist in radiating concussion; not more than six nails in each shoe evenly distributed, as nails destroy horn; these should not be driven higher than needful, for high nailing means "hoof ruin" sooner or later. Rasping the horn under the nail clinches is a pernicious habit that horseshoers persist in, notwithstanding the fact that it injures the horn and actually weakens the hold of the clinches.

Such briefly are the conditions which fulfill physiological shoeing. The old saw, "Fit the shoe to the foot," is not applicable until abnormalities in shape are first removed, typically shaped hoofs not being the rule by any means but the exception.

8th. The horse is unfortunate in being the only possessor of feet and teeth which are in a continual state of growth. No sooner is a horse's foot reduced to its proper proportions than it commences to materially interfere with his stability and equilibrium by its continued growth downward and forward. More bad results and hoof diseases arise from this one cause, than all others combined, and that is: long retention of shoes and allowing barefooted horses to run for long periods with their hoofs untrimmed. Whether shod or barefooted, the horse's foot requires the monthly attention of the horseshoer. The result of the neglect of this useful and necessary practice can be daily and plentifully seen, such as crooked feet, long toes, high feet, vertical walls, contraction, sidebones, quarter crack, navicular disease, thrush, high heels, scratches, brittle hoofs, ringbones, and all forms of lameness. Furthermore, a hoof thus neglected for a few months never, in my experience, regains its original healthy and physiological condition.

Finally, it must not be forgotten that the hoofs of the grain-fed horses grow considerable faster than those of his grass-fed brother, irrespective of the fact that the latter has to rustle for his living, thus giving his hoofs the necessary amount of wear and tear to keep them in proper shape.

PROFESSIONAL NOTES.

MODERN REPEATING FIREARMS.

Progress in the arts pertaining to the manufacture of arms has not been content with the production of magazine guns, but attention has been devoted to a self-loading system in firearms, to which the designation "self-cockers" has been applied, although this expression does not entirely cover the subject. In the technical field we shall never be able to dispense with foreign words entirely, and in the case under consideration international usage in that branch of the arts which deals with the manufacture of arms has combined on the term repeating firearms (*Repetirwaffen*). As this expression is universally understood, the use of a German word does not appear to be absolutely necessary.

It is not our intention to take a survey of the wide field of modern repeating firearms, but rather to examine a particular weapon, which will be all the more interesting to officers as it is now being exhibited in the main building of the Berlin Industrial Exposition by the well-known firm of LUDWIG LOEWE & Co., who explain the details thereof to all who may be interested.

The weapon we refer to is the repeating pistol of the Borchardt system. Its construction involves a movable barrel, and the recoil of each shot opens the breech, draws and ejects the empty shell, cocks the firing bolt, pushes the cartridge, which has come up from the magazine, into the chamber, and closes the breech, so that after each shot the pistol is ready to be fired again.

In these few words the whole program of the Borchardt repeating pistol is expressed. In its construction there are five principal parts, namely:

1. The butt, which with the trigger-guard and lock-case forms one piece, called the handle piece (3).

2. The barrel (1), attached to the forked frame (34), which leads into the lock-case.

3. The breech-block (41), with its firing bolt (43), knee-joint (47) to (49), springs and attachments.

4. The discharge mechanism (10), consisting of a trigger (10), a sear (35), safety plug (7), etc.

5. The magazine D. The illustrations herewith will serve to elucidate this description.

Examination of the separate parts of the pistol shows that the barrel, which is made of the best steel, has a calibre of .3012″ (practically the same as our carbine), with four grooves, making one turn in ten inches.

The barrel is screwed into the framework which is connected with the lock-case. The recoil of discharge drives the barrel and the framework to which it is secured—which also contains the mechanism for closing the breech—directly to the rear in prolongation of the axis of the bore, suitable projections sliding in the grooves of the lock-case.

At the end of the forked frame there is a connecting pin (56) fitted in like an axle. The rear limb of the knee-joint, lying between the arms of the forked frame, swings about this pin, and its projecting ends pass into a slot in the lock-case, thus limiting the movements of the barrel. In order to protect the connecting pin against lateral displacement, the slot is covered with plates (24). The rear end of the knee-joint carries three friction rollers, and is made large enough to fit in the space between the walls of the lock-case.

The middle of the knee-joint, which rises when the pistol is opened, straddles both arms of the forked frame (34), and has a knob on the left side by means of which the mechanism can be opened by hand. On the right side there is a catch lever which, when the mechanism is closed, snaps over a hook riveted to the gripe.

Thus we see the rear link (49) of the knee-joint securely attached by means of the connecting pin, the middle, however—and with it the joint proper which rises—free for movement. The fore end of link (47) is attached to the breech-block (41) by a hinge joint, so that when the knee-joint rises the breech-block makes a horizontal movement to the rear, guided by grooves in the forked frame, into which two ribs on either side of the breech-block fit.

The left rib of the breech-block is itself grooved in the direction of its length, so as to make room for the nose of the sear (35). The firing-pin lug comes into this groove; when the breech-block is pushed forward this lug is engaged by the nose of the sear and the firing-pin is cocked.

The firing-pin (43) is a hollow cylinder with lug, as stated. In the hollow we find the firing-pin spring, the rear end of which rests against the screw-plug (42), closing the rear end of the breech-block.

The front end of the breech-block is countersunk to receive the cartridge. On top there is a spring extractor with claw, and at the bottom a slat for the spring ejector (14); both of these devices come into play as soon as the breech-block moves to the rear, that is, is drawn back by the knee-joint.

Figure A.

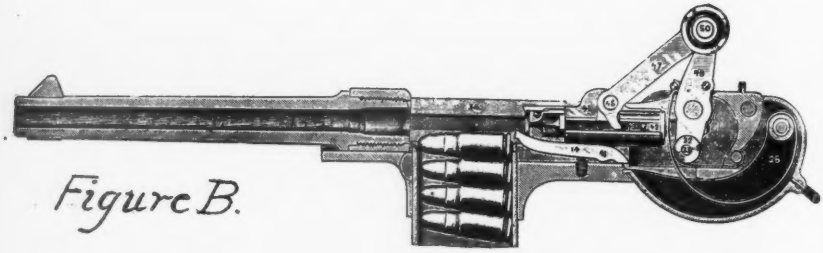


Figure B.

Figure C.

The rear end of the lock-case is closed—with exception of the apertures necessary for springs—by means of the curved piece (19). Through two ears at the extreme end of this curved piece a screw is passed which serves to secure the cover for the spring which is inserted between the walls of the lock-case, and also to maintain the closing spring in its proper position. The shorter arm of this spring rests against the lower wall of the lock case; it is then bent over a bolt secured to the spring cover and passes forward in a long curve, the distal end hooking over a stirrup at the end of a swinging hamper attached to the rear link (49) of the knee-joint.

A second spring—the recoil spring—is secured at the rear of the lower portion of the lock-case by means of a pin. The front end of this spring is bent upwards.

The repeating mechanism of the pistol operates as follows:

When the pistol is fired the barrel, the frame to which it is attached, and the hinge mechanism move backward (.118 inch) pushed by the recoil until the friction rollers of the knee-joint come in contact with the curved butt piece and by its shape are forced downward. In this way the knee-joint is raised at its middle hinge and the breech-block, as already stated, is drawn back; the empty cartridge shell impinging on the ejector (14), is thrown out after having been withdrawn from the bore by the extractor at the very beginning of these movements.

The momentum of the movable parts produced by the recoil overcomes the tension of the firing pin spring and the closing spring, so that the recoil spring which catches the friction rollers has but little to do to take up the remaining forces. For this reason the pistol causes only a very slight blow to the hand of the person firing it.

As soon as the momentum, produced by the recoil, has been expended in opening the parts, the return activity of the compressed springs goes into operation.

The closing spring, assisted at first by the recoil spring, straightens out the knee-joint; the breech-block shoves the cartridge, which has come up from below, into the barrel, which is also moving to the front again; and the lug of the firing pin is held by the nose of the sear, with the firing-pin spring compressed. These movements take place so rapidly that the eye is unable to follow them.

The sear makes the necessary movements at the same time, so that immediately after the automatic closing of the breech the weapon is ready to be fired again.

The ammunition for this repeating pistol consists of loaded metallic cartridges with primer in the base. The cartridges are forced up from the magazine, inserted into the gripe by the pressure of a spring, and placed in front of the breech-block as soon as the latter in opening has reached its greatest distance to the rear; and after insertion in the chamber of the bore and closing of the breech-block the piece is discharged by pressure on the trigger, which releases the firing-pin.

The magazine (D), is made of sheet metal. It is inserted into the hollow gripe from below and is held in place by the spring holder (8), which is situated on the left side of the lock-case. A slight pressure on the holder releases the magazine so that it can be drawn out from the bottom of the gripe and a filled case inserted in its place.

The zig-zag spring formerly used in the magazine has been replaced by two spiral springs, and the metal walls have been indented, thus strengthening the magazine. Details of the magazine are shown in Figure D.

The cartridges are held in position against the pressure of the spiral springs by lips of the lateral walls of the magazine, which partially cover the rear half of the upper cartridge. The rear portion of the upper end of the magazine is rounded off somewhat, so that the breech-block in going forward can take the top cartridge from the lips of the magazine and push it into the bore.

The spring of the magazine-holder also reaches under the safety-bolt (7), which is situated in a groove cut in the left outer wall of the lock-case. When the safety-bolt is down its upper end is flush with the edge of the lock-case. To place the pistol at "safety" the bolt is pushed upward over the rear arm of the sear, behind a projection thereon. The sear is thus prevented from giving way upward, and at the same time the barrel and the trigger are secured, and opening of the knee-joint is prevented. Both the safety device and the magazine-holder are conveniently operated by the thumb of the right hand. The rear sight is attached to the upper surface of the curved piece of the lock-case; the front sight is fixed on the barrel near the muzzle. A long line of sight is thus obtained which permits very accurate aiming.

The handling of the Borchardt repeating pistol is extremely simple, and taking it apart and putting it together again does not produce any difficulties. To load the magazine, seize it with the left hand, push the cartridges under the projecting lips with the right hand, assisted by pressure with the index finger of the left hand on the cartridge about to be inserted. The greatest load consists of eight cartridges. The magazine is placed in position by inserting it into the opening of the gripe and pushing upward until the magazine-holder seizes it. A slight tap with the left hand against the bottom of the magazine will usually cause the holder to snap into place.

The barrel is loaded by seizing the knob of the knee-joint and pulling back until the breech mechanism is completely open (Figure B), and then releasing the knob. Pressure from the large closing-spring, which was compressed when the mechanism was opened, will push the top cartridge into the bore. The weapon is now loaded, cocked and ready to be fired. The pistol is fired by the usual pressure on a trigger. After each shot the pistol remains loaded and cocked. If we do not wish to fire the whole number of cartridges the safety device is pushed up with the thumb.

To take out the magazine, press on the button of the magazine-holder with the right thumb and withdraw the magazine from the bottom of the gripe. This can also be done when the pistol is at "safety," and by means of the holes in the walls of the magazine the number of cartridges remaining therein may be ascertained.

We shall now go into some detail as to the features of this pistol.

The weight of the pistol with a barrel 6″.06 long is $2\frac{1}{16}$ pounds; with a barrel 7″.48 long the weight is $2\frac{1}{16}$ pounds. The magazine weighs 1.94 ounces; the loaded cartridge 155.1 grains; the cartridge shell 71 grains; the steel-coated bullet 77.1 grains; the powder about 7 grains. The length of the cartridge is 1.38″; the caliber is .3012″; the number of grooves is 4; initial velocity, taken at eighty-two feet from the muzzle, is 1,312 feet. (For hunting and target pistols special barrels and ammunition are used).

When we come to consider the properties of the repeating pistol of the Borchardt system we observe, in the first place, that its exterior form causes surprise because it is unusual and appears strange. Thus the rear part with all its mechanism lying behind the gripe and projecting over the wrist, is especially striking. This is an important feature in the *mêlée* and in street fights, and constitutes an advantage which the Borchardt pistol possesses over all revolvers and pistols the rear end of which terminates with the gripe. For in the *mêlée*, when we desire to knock the pistol out of an opponent's hand, we endeavor to deliver a blow on his right wrist which will generally cause the weapon to drop to the ground. But with the Borchardt pistol this is impossible, for the lock-case with its mechanism completely protects the wrist—an advantage which certainly is not of small value.

But when we take up this weapon and fire with it our surprise is increased because of its many ballistic and other properties, which cause the construction to appear as a truly remarkable one, since it seems to satisfy all the conditions of a useful military weapon.

The various experiments made with it have shown a very flat trajectory as well as small horizontal and vertical deviation.

The accuracy of the weapon is increased, moreover, by the comparatively long distance between the sights and the very slight recoil. It is favored, rather than injured, as we are prone to believe, by the movement of the barrel to the rear, for the barrel is constantly opposed by the uniform resistance of the springs acting as a counterpoise, and the movement of the weapon is always in a direction coinciding with the axis of the bore. Numerous practical experiments have fully established this favorable fact.

When we desire to change our aim rapidly from one object to another, the central location of the center of gravity becomes a matter of importance; in this weapon the unfavorable effect of a preponderance of weight in front of the gripe existing in other pistols is entirely removed. This is of great value in mounted

practice at the faster gaits, especially at the gallop, as is the custom in America where only one-tenth of the allowance of ammunition for pistol practice is used dismounted, the remainder being fired from the back of the horse.

Precision in loading contributes to the accuracy of the weapon. As a perfectly fine-grained powder is used the accuracy of loading can be adjusted to within one-twelfth of a grain.

The ballistic effect of the bullet is considerable; at eleven yards it will go through two men, one standing behind the other. Or, it will penetrate twenty $\frac{8}{10}$ inch fir boards set up with half-inch spaces between them, or a swinging steel plate $\frac{1}{8}$ inch thick. At 550 yards it will still enter over two inches into fir.

The facility with which the repeating pistol is handled is noteworthy. The weight of the weapon is small ($2\frac{3}{4}$ pounds), the cartridge is light, the recoil is scarcely perceptible, and the rapidity of fire is incredible, almost like lightning. Twenty-four shots can be fired in ten seconds, provided the firer has two filled magazines at hand, for the magazines can be changed in two seconds. In the operations of removing and replacing the magazine and of removing the safety device the pistol is retained in the right hand. A comparison with the instructions necessary for loading and unloading the ordinary cylinder revolver will establish the great advantage of the repeating pistol in rapidity of loading.

The rapidity of fire is of the greatest interest. The question arose: What is the limit of the rapidity of fire of this weapon? Not how fast can the firer shoot it, but of what rapidity of fire is the pistol capable without failure in the mechanism.

To answer this question an experiment was made with a target consisting of a broad strip of paper attached to rollers. The pistol was placed in a vise and the trigger was so arranged that the pistol was fired automatically as soon as the breech-block was closed after each shot.

The details of this experiment are as follows: Calibre of pistol, .3012″; length of bore, 7″.48; weight of the bullet, 77 grains; weight of the Walsrode smokeless powder charge, 7 grains; rate of movement of the paper strip, 20.6 feet per second; distance between the first and eighth shot holes, 6.46 feet; time required for the eight unaimed shots with automatic trigger pull $= \frac{6.46}{20.6} = .3134$ of a second. As there are seven intervals of time between the first and eighth shots, each shot followed its predecessor at interval of $\frac{.3134}{7} =$ .0448 of a second time, that is, at the rate of $22\frac{1}{3}$ shots per second, or of 1,340 shots per minute.

Repeated experiments conducted in the presence of the writer of these lines showed that this is not a case of theoretical calculations, but of undeniable facts.

Objection might be made that such enormous rapidity is valueless, because of no practical use to the marksman. Of course no man is able to fire as rapidly as an automatic machine, yet the rapidity here developed proves the excellence of material and accu-

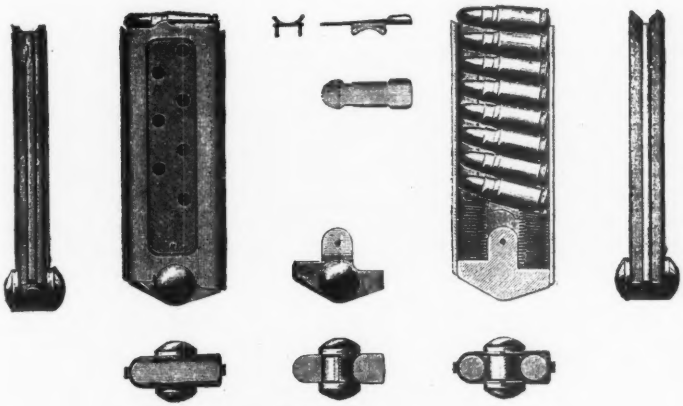


Figure D

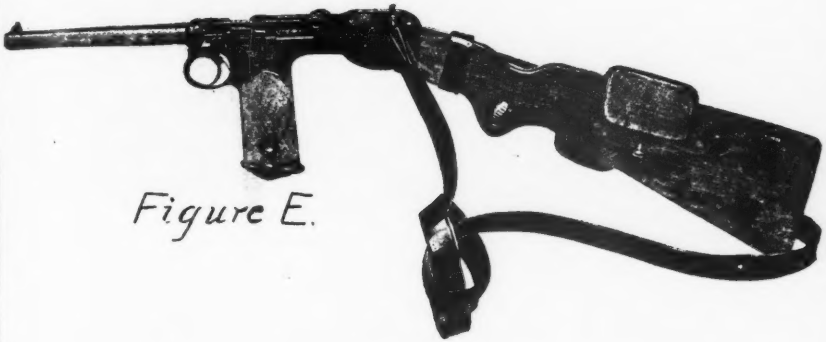


Figure E.

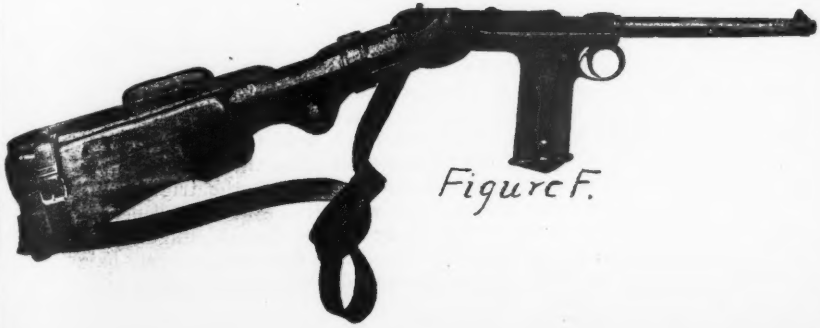


Figure F.

rate working of all parts of the mechanism, and justifies the conclusion that in the most rapid fire of which the marksman is capable with the Borchardt repeating pistol miss fires are practically impossible.

In an experiment of this kind the pistol was placed in a vise about one yard above the floor. The first shot was fired by pulling back the knob of the knee-joint to the fullest extent and then quickly releasing it. The eight shots produced almost a single, somewhat prolonged sound; the opening and closing of the mechanism could not be observed from the rear, but only by standing at one side. The empty cartridge-shells were thrown out vertically, and the first empty shell was heard to strike the board floor long after the eighth shot had been fired.

These facts are given simply to furnish proof of the faultless working of the mechanism, and hold good whether the series of shots are fired in rapid succession or after prolonged intervals. The reason of this lies in the fact that the mechanism does not become fouled in firing; all the gases have disappeared through the muzzle and there is no pressure in the bore when the breech-block is opened. It is therefore impossible for any residue or unconsumed powder to be driven into the opening mechanism, and thus all fouling is avoided. In case of exposure of the parts to moisture, dust, etc., they worked as satisfactorily as before.

The separate parts of the pistol are not very numerous and are of solid construction throughout; moreover, they are exchangeable, and taking apart and putting together does not take much time. It is kept in order in the easiest way imaginable; a drop of oil on a piece of wadding or soft rag is sufficient to wipe and lubricate the mechanism after prolonged practice in shooting.

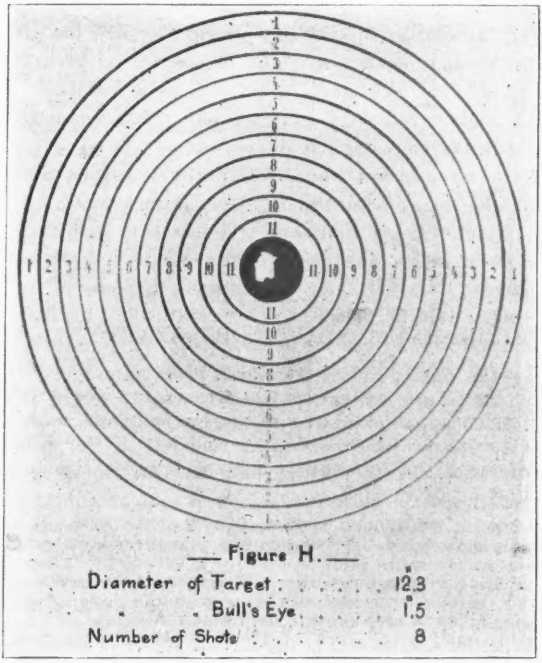
The spare parts are kept in a small case, which can be carried like a hand-bag; it contains a jointed wiping rod, a screw extractor and a block of wood to hold the breech-block open. All the parts are of course made of the best materials. An extremely valuable feature lies in the possibility of using the pistol as a carbine, for which purpose a stock is provided, so that the usual aim with the cheek resting against the stock may be taken.

On the march the pistol is strapped to the stock with two small straps and placed in a leather holster, which is carried by means of a strap over the left shoulder, the weapon hanging behind the right hip. In proximity of the enemy the two parts are unstrapped and the stock is secured to the pistol by a swallow-tail attachment tightened by a screw, an operation which is easily and quickly accomplished. The weapon thus converted into a gun remains attached to the carrying strap. The firer can then seize the gun stock with the right hand, bring it to the shoulder and pull the trigger with the index finger of the left hand. Even with right-handed persons this causes no difficulty; it is scarcely noticed that the finger of the left hand is used to pull the trigger, and the fact that the right hand is used only to hold the gun to the shoulder without attention to the

trigger, is found to be agreeable rather than otherwise. Accuracy of aim is increased thereby.

Attachment of the stock to the pistol is shown in Figures E and F.

In Figure E we see the left side with the check piece attached to the stock; whereas in Figure F the leather holster fastened to the right side of the stock for the reception of the detached pistol is shown.



— Figure H. —

Diameter of Target	12.3
" Bull's Eye	1.5
Number of Shots	8

It is by no means intended that the Borchardt repeating pistol should completely displace our somewhat out-of-date army revolver, for not all the troops armed with a revolver would need a repeating pistol. The price, 140 marks, of the complete pistol with all the attachments and parts, including stock and holster, would indicate rather limited use in the army, although in the manufacture of large quantities a reduction in price is to be expected. But cavalry officers, mounted messengers, and military cyclists would, with the Borchardt repeating pistol, be much better equipped for self-defense, in case they are thrown on their own resources, than with the army revolver. This pistol must also be regarded as an incom-

parable weapon for all officials armed with firearms, such as policemen, revenue officers, foresters, prison guards, etc.

To complete this article we state that the Borchardt repeating pistol has been practically tested by an Austrian technical committee in Vienna, by the Naval Small Arms Board at Newport, and by the Small Arms Proving Commission at Spandau–Ruhleben.—*Militar–Wochenblatt, Nos. 84 and 85 of 1896. Translated by Lieutenant J. T. Dickman, Third Cavalry.*

Through the courtesy of Captain R. K. EVANS, Twelfth Infantry, late military attaché at the Court of Berlin, we had the pleasure of examining the Borchardt pistol and of testing its accuracy, penetration, rapidity of fire and range. It is a beautiful piece of mechanism, and we believe that it will easily satisfy all the claims made for it in the above article.

We reproduce a target made by Captain EVANS in the shooting gallery of the manufacturers, LUDWIG, LOEWE & Co., of Berlin. Distance, fifteen yards; diameter of bull's eye, one and one-half inches; pistol attached to stock. J. T. D.

A FIELD EXERCISE AT FORT LEAVENWORTH.

During the past year the Japanese press announced, at various times, that the future maneuvers in that country would be executed under conditions approximating more closely to the realities of war than any that have hitherto been carried out in European armies. The character of the innovation contemplated is clearly indicated in the following extract:

"The chief of the General Staff, desiring that the exercises of this year be not an idle show, has decided that on each maneuver day a certain number of companies and batteries shall be directed to execute, for short periods of time, actual firing with ball cartridges. This firing to commence upon receipt of the order therefor, no matter in what position the designated unit might be, care being taken to keep the selected moment a secret."

This measure was discussed in the superior war council of Japan where the maneuver regulations embodying this feature were compiled. The maximum number of ball cartridges to be fired is specified with great minuteness. The reason upon which the council based acceptance of this proposition was the necessity of having infantry thoroughly broken to fire discipline, so that they might gain thorough confidence in the efficacy of their own fire, and at the same time know how to take advantage of all the features of the ground to escape the effect of the enemy's fire.

The report of the Japanese Chief of Staff terminates as follows:

"The instruction of our army demands the sacrifice that the introduction of actual firing into the exercises carries with it. A little blood spilt in time of peace, opportunely, will economize rivers of blood which would be shed by our infantry in battle against Europeans armed with improved weapons."

We shall not go into the possibilities of this innovation. It seems as if the many troubles of the unhappy umpire are to sustain a further increase, and that in future both sides will pour hot shot into him, actually as well as verbally.

It will no doubt be some time before cis-atlantic imitations of warfare arrive at the above degree of realism; in the meantime, with all due regard for cutaneous entirety, much valuable instruction of a practical nature may be imparted in field exercises conducted according to well established methods The frontier as a school having disappeared, there is no other way of illustrating and fixing in the minds of our young officers the elementary principles governing the handling of troops in campaign.

Book knowledge in most cases is so evanescent that it may safely be asserted that a few practical exercises, properly conducted, produce a more lasting impression than months of theoretical plodding. The following are the more important sources of the benefits to be derived from field exercises with troops:

(*a*) *The duties of the commanders before the exercise.*

1. Repeated careful reading of the problem, map in hand.
2. Careful study of the ground involved in the problem.
3. Accurate conception of the situation on both sides.
4. Measurement of distances on the map and calculation of the time required by the enemy's troops, as well as our own, to march certain distances.
5. Deliberation concerning the measures likely to be adopted by the enemy.
6. Formation of a clear and precise plan.
7. Working out of a suitable disposition of the troops.
8. Drawing up and issuing of the necessary orders governing the actions of the subordinate commanders.

(*b*) *Duties of commanders during the exercise.*

1. The proper time for starting the troops from their parade grounds having been selected, the commanders cause the necessary calls for their formation to be sounded.
2. The troops are then marched to the designated rendezvous in the proper manner.
3. The subordinates are assembled and the exercise is explained to them; the necessary orders are then issued. The instructions of the director will ordinarily indicate whether orders may be issued before leaving garrison or not until arrival at initial points of the exercise.
4. Tactical handling of the troops when approaching the enemy and in his presence. All subordinate commanders, and the troops, are benefited at this stage of the exercise.

(*c*) *Duties of commanders after the exercise.*

Reports, with the usual sketches, messages of subordinates, etc., are required to be rendered within twenty-four hours.

(*d*) *Discussion.*

After the exercise the officers who participated are assembled. The director states the problem, explains its various features, indicates a solution, and criticises the solution of the commanders. Opportunity is afforded to ask questions and to enter into a brief discussion of various phases of the exercises, after the movements have been represented on a large map or blackboard.

The benefits which may thus be derived are too obvious to require more than mere mention. A few moments may suffice to illustrate, practically, whole pages of "Security and Information." Inexperienced commanders, when suddenly confronted by an emergency, are likely to be seized with that indefinable feeling of helplessness which in peace maneuvers is the cause of wrong commands and awkward movements, and in time of war is the prelude to flight. Practice in handling troops, and the habits of forethought brought out in these field exercises will, in naturally quick minds, go a long way towards cultivating that mental state of instant readiness which is one of the characteristics of genius. On the principle of the runner who wears slugs of lead in his shoes while exercising, in order to be lighter on his feet on the day of the test, the young officer who has had opportunities to command relatively large bodies of troops, will handle his company or platoon with comparative ease.

At some of our schools for officers, such exercises now form a considerable part of the course of instruction. As an illustration of what is being done in this line at the most important of our service schools, we reproduce the following rules and exercise:

RULES FOR FIELD EXERCISES AT THE U. S. INFANTRY AND CAVALRY SCHOOL.

1. The statement of the general idea is furnished to the umpires and to commanders of opposing forces.

2. Special instructions given to either commander are not communicated to his opponent, but are furnished to the umpires.

3. Umpires wear a white band on the right arm. Spectators are expected to wear one on the left arm.

4. The decision of an umpire must be prompt, irrevocable, and at once obeyed. No umpire should allow himself to be prejudiced for or against either side.

5. The opposing forces are designated as the Blue and the Brown. The Blue, including officers, wear the regulation uniform with forage caps. The Brown wear canvas fatigue coats and campaign hats, their officers wearing campaign hats.

6. Before leaving the parade grounds, rifles, carbines, pistols and cartridge belts will be inspected by the officers to see that no ball cartridges are taken.

7. Whenever the senior umpire judges it necessary to suspend movements he will cause a trumpeter to sound "Recall." This signal will at once be repeated by all trumpeters. All forces will cease firing, halt and remain in their positions until the signal "Attention" is given for resuming operations, which signal is repeated by all trumpeters. The "Recall" followed by "Officers' Call" will signify that the exercises are at an end.

8. The trumpet signals, "Recall," "Attention" and "Officers' Call" will not be ordered by any other officer than the senior umpire. The signals "Cease Firing" and "Halt" may be ordered by any umpire and are applicable only to such portion of the line as he may direct.

9. The similitude of actual warfare will be maintained as far as possible. An unmeaning fire is forbidden.

10. Forces advancing under fire which in actual battle would cause their annihilation will be ruled out of action by an umpire.

11. If forces be halted in close order under severe fire the umpire rules out of action such numbers as he deems proper.

12. Officers usually dismount at 600 yards from hostile fire unless they be cavalry officers engaged in mounted action.

13. Umpires place any officers out of action who remain mounted at a halt within 300 yards of hostile fire, or, if on foot, remain standing unsheltered within that distance.

14. The actual collision of opposing forces or individuals is a punishable offense in these exercises. When attack and defense have reached the stage just preceding the crisis, the senior umpire suspends all movements.

15. Civilians passing must not be stopped; therefore, neither party should question them about the other's movements.

16. Private grounds off the reservation will not be entered without permission.

17. Blank cartridges must not be fired at less than 100 yards from the supposed enemy.

18. All officers see that the men do not fire without command, excepting when thrown on their own responsibility, as a scout, sentinel, or member of a patrol; that they do not fire after the command "Cease Firing;" that they never fire while moving; that they always take careful aim with the elevation ordered.

19. Officers commanding organizations see that the number of rounds fired is limited to that which is sufficient to denote the position occupied or the object to be attained by fire.

20. Firing in the immediate vicinity of haystacks and buildings is forbidden.

21. Cavalry charges stop at 100 yards from the supposed enemy.

22. If a cavalry commander, intending to use fire action, allows a mounted opposing force to approach prepared for charging with adequate strength and within 200 yards of his position, before his own troops are formed for firing dismounted, the advantage will be awarded to the mounted party unless the ground is manifestly unsuited to charging. If adequate dismounted fire is opened upon a mounted party within 500 yards, the advantage will be awarded to the dismounted party.

23. When the flank of a position is turned, unless a change of front with sufficient force is executed in time to meet it, the turned party must fall back to a new position. If the turning party throws an adequate fire upon the flanks of its opponent in line, the umpire rules out of action as many men, or such forces, as he deems proper.

24. If a party interpose between an inferior party and the main body of the opposing force, without being subjected to a superior fire from the main body, the intercepted party must surrender. If the interposing party be caught between the simultaneous attack of the main body and the intercepted party, the interposing party must surrender.

25. A scout or member of a patrol fired upon within a range not over 150 yards and ordered to surrender by superior numbers must comply with the order at once. He must surrender if summoned within 100 yards by one opponent who has the drop on him. If fired upon at a distance greater than 150 yards he will escape unless an umpire rules otherwise. Enlisted men violating this rule will be followed and identified with a view to preferring charges under 62d Article of War.

26. A column fired upon by artillery at less than 1,800 yards must deploy. Umpires will allow an exception when the commander judges accurately that the ground affords shelter to the force.

27. Each commander will submit a report of operations at such time as may be designated. He will call upon his subordinates for such reports as he deems necessary to accompany his own.

28. An officer will be detailed to accompany each command as topographical officer. He will prepare a map of the field and submit it to be forwarded with the report of the commander. This applies also when detachments are necessary to a considerable distance from the main force.

29. Should an officer claim that the ruling of an umpire is erroneous he must give his reasons in writing.

30. The decision in regard to advantage obtained or lost in the operations as a whole, and remarks on the action of commanders, will be made after the reports have been received.

UNITED STATES INFANTRY AND CAVALRY SCHOOL, DEPARTMENT OF MILITARY ART.

Field Exercise No. 5.

GENERAL IDEA.

A Blue army, deficient in cavalry, is operating towards the south along the west bank of the Missouri River, and has reached Kansas City; it depends on the Missouri Pacific Railroad for its supplies. Raiding forces of Brown cavalry and guerillas make it necessary that the railroad be strongly guarded.

SPECIAL IDEAS.

Blue.

The commander of the Twentieth Regiment of Infantry is ordered to protect the Missouri Pacific Railroad tracks on the military reservation of Ft. Leavenworth. The section between the prison brickyard and the Rock Island bridge has been fortified and will be held by the Third Battalion of the regiment.

Start: 1 P. M.

Brown.

A raiding force, composed of the First Squadron, Sixth Cavalry, and some guides, is ordered to destroy the Missouri Pacific Railroad tracks, trestles, etc., on the military reservation of Fort Leavenworth. The portion between the prison brickyard and the Rock Island bridge is known to be secure against attack.

Rendezvous: On Sheridan's Drive, near rock quarry, at 1:20 P. M.

SOLUTION OF THE PROBLEM.

The Blue commander drew up the following general plan:

To occupy the northern portion of the line strongly at points where cavalry could operate, at the same time sending scouts well to the front to give warning of the approach of the enemy, and keeping the track well patrolled.

To occupy the southern part of the line with a considerable force near the reservoir and at points where roads lead down to the track, holding positions commanding the track, and arranging for cross-fire on exposed portions. All culverts and trestles to be guarded by small detachments to prevent destruction by patrols or individuals slipping through the line. All available means of observation to be utilized.

He accordingly drew up and issued the following order:

FIELD ORDERS } FORT LEAVENWORTH, KANSAS, April 15, 1897.
No. 1. } 12:40 P. M.

Distribution of Troops:

(Twentieth Regiment of Infantry.)

First Battalion (Lieutenant HUGHES), north of brickyard.

Second Battalion (Lieutenant PRICE), Rock Island bridge to North Leavenworth.

Third Battalion (imaginary), from brickyard south to Rock Island bridge; position is fortified.

I. The enemy, composed of cavalry and guerillas, is in the vicinity of Fort Leavenworth, Kansas, threatening the destruction of our line of communication, the Missouri Pacific Railroad.

II. The regiment will protect that portion of the line which is on the military reservation of Fort Leavenworth.

III. At 1 P. M. to-day the regiment will assemble.

The First Battalion will protect the track from the brickyard to the northern limit of the reservation, a distance of 2,700 yards. The Second Battalion will guard the track from the Rock Island bridge to the southern limit of the reservation, a distance of 2,300 yards. The Third Battalion (imaginary) is supposed to hold fortified positions between brickyard and Rock Island bridge.

IV. I shall be in the vicinity of the Rock Island bridge.

J. R. LINDSAY,
First Lieutenant, Eighteenth Infantry.

Verbally to assembled commanders.

Let us now look at the plan of the Brown commander:

Plan of Attack for the Brown Cavalry Squadron in the Solution of Field Exercise No. 5. (*This plan is subject to change.*)

On arrival at rendezvous, after a careful explanation of the problem, six officers' patrols of six men each will be sent out to locate the position of the guard left by the Blue army. The terrain and position will be divided equally among the patrols.

Three of the patrols will be sent east and southeast to explore the flanks and front of the position from the Rock Island bridge to Leavenworth, for the purpose of locating their forces on that part of the line, with orders to return and report.

Three similar patrols will be sent north, northeast, and north northeast, to discover the enemy's strength and position on that part of the line, with orders to return and report. More careful explorations will be made to the north, with the idea of attacking in that direction.

The patrol sent to the extreme southeast of the line will not be expected to join the squadron on account of the distance it has to travel, but will be given high explosives, with orders to blow up a portion of the track between Corral Creek and the town, secretly, if possible.

The patrols will be given one hour to make their reports. The

high points on Sheridan's Drive will be occupied at once by patrols, at a gallop.

When the patrols have reported, the squadron will move at a trot, under cover, to the most vulnerable point of the enemy's line. When the squadron has approached as near as it can mounted, three troops will dismount for fighting on foot. The remaining troop will try to turn the enemy's outer flank, mounted, and then dismount in an attempt to gain the railroad and blow it up or disable it.

The Brown commander therefore issued the following order:

ROCK QUARRY, SHERIDAN'S DRIVE,
NEAR FORT LEAVENWORTH, KANSAS,
April 15, 1897—1:20 P. M.

DETACHMENT ORDERS
No. 1.

Order of March.

Advance Guard:

Troop "K," (Second Lieutenant CLAYTON, Fifth Cavalry, commanding).

Main Body at 200 yards:

Troops "F" and "B," and Troop "C," except one platoon (First Lieutenant STEVENS, Ninth Cavalry, commanding).

Rear Guard:

One platoon, Troop "C," (Second Lieut. REEVES, Fourth Cavalry, commanding).

I. The Blues have left a strong guard to protect the Missouri Pacific Railroad. It is open to raid only between the northwest corner of the military reservation and the prison brickyard, and between the Rock Island bridge and the southeast corner of the reservation.

II. Officers' patrols will find the enemy and report point most favorable for successful attack. Reports will all be made before 2:30 P. M., and all patrols will return here by that time, except one exploring Corral Creek south to Leavenworth; this patrol will send back report. In case squadron has to leave present position, guides will be left to conduct patrols to their troops.

III. The advance guard of the squadron will be ready to move at 2:35, and main body at 2:40 P. M.

The three leading troops, under command of Lieutenant STEVENS, will, on reaching position indicated by squadron commander, dismount to fight on foot under cover, and, after allowing ten minutes for the flanking detachment to gain its position, advance on the enemy.

IV. The fourth troop, including rear guard, commanded by Lieutenant REEVES, will remain mounted, and will take the trot until they gain enemy's flank and rear, when they will fight on foot, and cover working party.

V. All commands will be given by signal.

VI. Horses will be left under cover with guard.

VII. I will be with advance guard until squadron dismounts, and then with flanking detachment.

Lieutenant STEVENS will command front attack.

J. M. STOTSENBURG,
First Lieutenant, Sixth Cavalry.

Verbally to assembled officers.

DISPOSITION AND MOVEMENT OF THE TROOPS.

The Twentieth regiment of infantry was formed at 1 P. M., and the battalions started at once for their respective sections. The companies of the First Battalion took positions as follows: One company a few hundred yards north of brickyard; another a little north of prison cemetery; a third near the point where the Millwood road first touches the railroad; the fourth at slough crossing north of the track. These positions are shown on the map herewith. The companies of the Second Battalion were posted at favorable points in the southern section, but as no demonstrations except by a few patrols were made against them, a map of that section is not furnished.

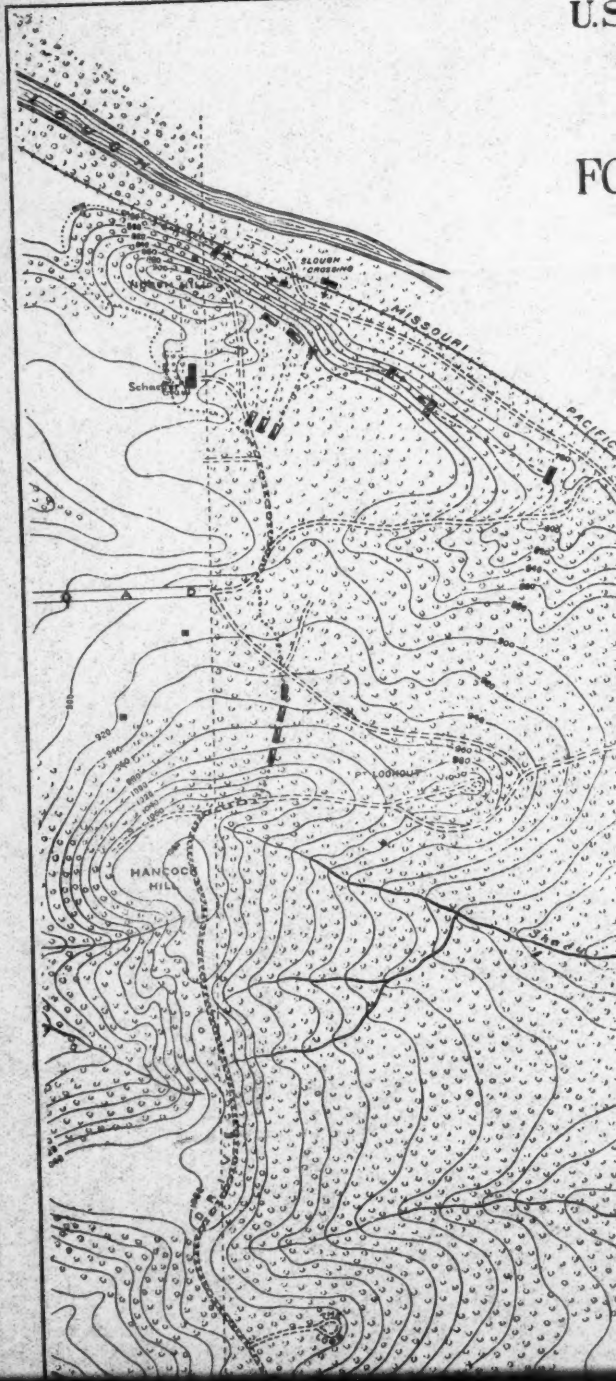
The Brown force halted on Sheridan's Drive near the rock quarry (about 600 yards south of the one shown on the map) at 1:20 P. M. After the problem had been explained by the commander, officers' patrols started out at once, with orders to regain the squadron by 2:30 P. M., and the squadron was placed under cover down the eastern slope of the hills. When information as to location of the enemy had been received, the squadron, under cover all the way, moved towards the north. Its trail is shown on the map. Three troops dismounted near the SCHAEFFER house and deployed on the edge of the bluff; the other troop marched around North Hill, and then dismounted. All these movements were made without being discovered by the enemy. One platoon was sent to the southeast to detain a possible advance by the enemy from that direction. More than three troops of cavalry were thus brought within 150 yards of the isolated company of infantry at slough crossing before the Blues became aware of their presence. The advance of the third company, after firing commenced, is shown in shaded lines.

COMMENTS.

The leading idea when this exercise was devised, was to impress upon the participants the great advantage to an infantry command of having some cavalry for purposes of exploration and rapid conveyance of messages and orders. In this case exploration on the part of the Blues was defective, much more so than the commander had intended. The Browns were thus enabled to bring a superior force against an exposed part of the line, which, under the circumstances could not have been reinforced in less than ten minutes. The Blue company behind the railroad embankment at slough crossing was in a very exposed position. It had no means of retreat to the rear as the high water almost touched the feet of the men. If part of the Brown force had crossed the track south of their position, the Blues would have been enfiladed on both flanks and cut off.

In the tactical execution of the final attacks some errors were committed which we shall not discuss here. Enough has been given to show that such exercises may be made both instructive and interesting.

J. T. DICKMAN,
Lieutenant, Third Cavalry.


U.S
FC
SLOUGH CROSSING
MISSOURI
PACIFIC
Schaefer
Ft. LOOKOUT
HANCOCK HILL

U.S. INFANTRY AND CAVALRY SCHOOL.

DEPARTMENT OF MILITARY ART.

MAP

OF

FORT LEAVENWORTH, KANSAS.

AND VICINITY

COMPILED FROM THE BEST SOURCES

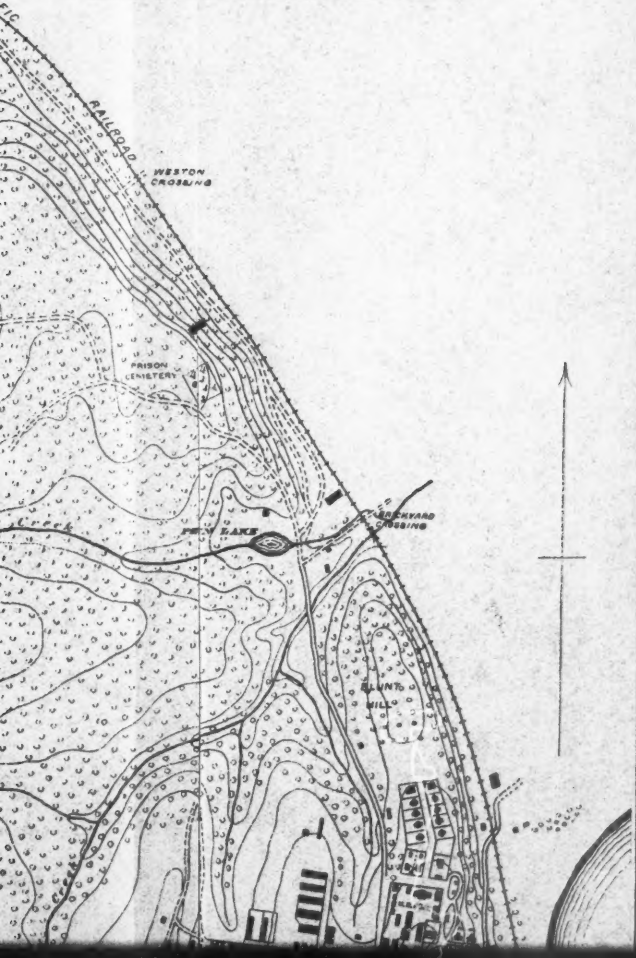
BY

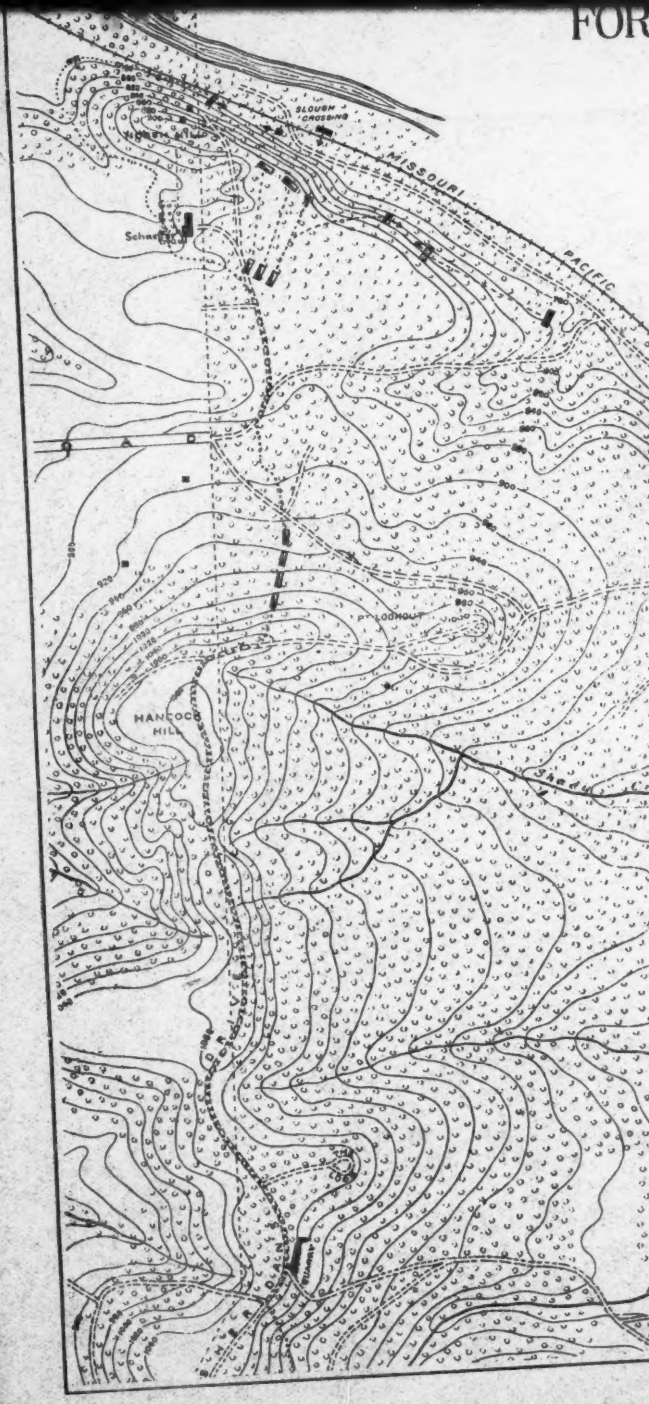
1ST LIEUT. J. T. DICKMAN, THIRD CAVALRY

ASSISTANT INSTRUCTOR IN CHARGE

DRAWN BY A. J. ROBERTSON.

1897.




SLOUGH CROSSING
MISSOURI
PACIFIC
Scharf
HANCOCK HILL
PT. LOOKOUT
Shaw

FORT LEAVENWORTH, KANSAS.

AND VICINITY

COMPILED FROM THE BEST SOURCES

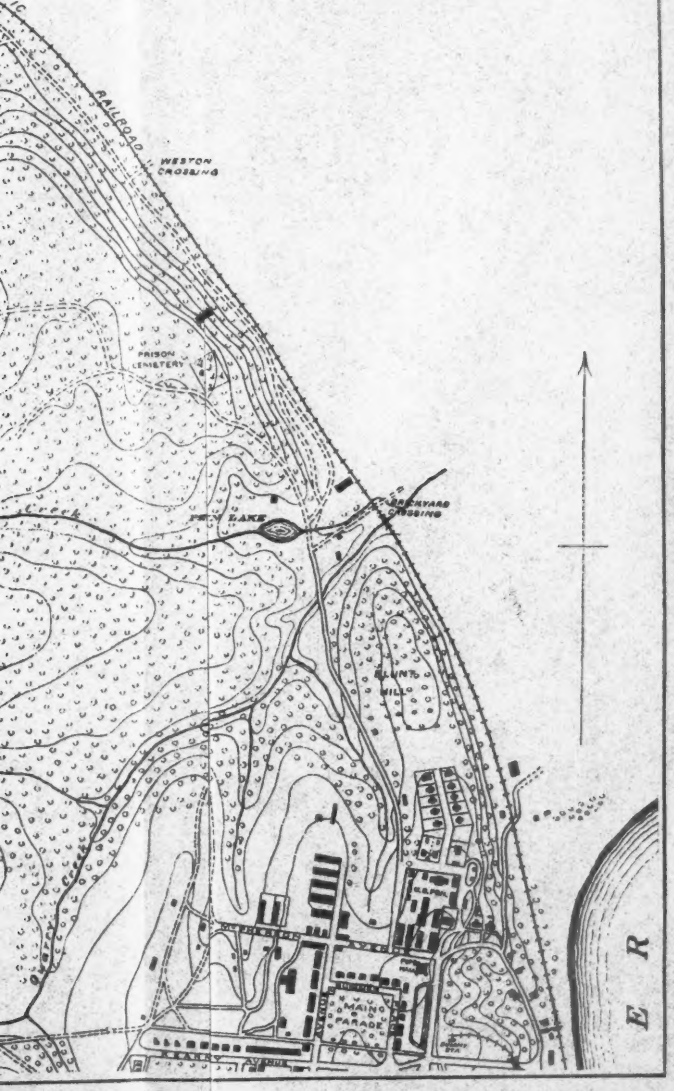
BY

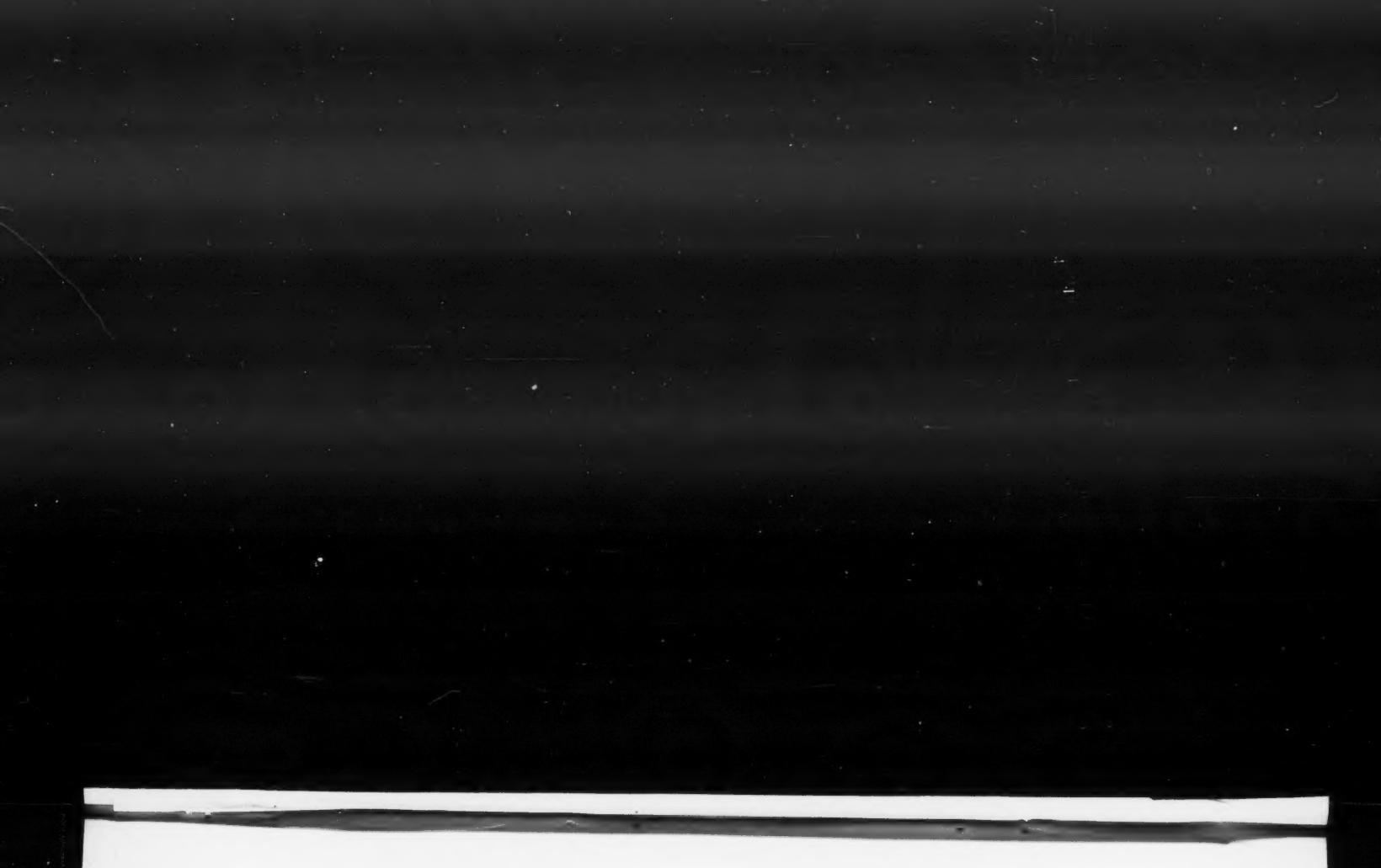
1st Lieut. J. T. Dickman, Third Cavalry

Assistant Instructor in Charge

Drawn by A. J. Robertson.

1897.





A FIELD EXERCISE AT FORT RILEY.

RULES FOR THE GOVERNMENT OF FIELD EXERCISES AND COMBINED MANEUVERS AT FORT RILEY, KANSAS.

In order that field exercise and combined maneuvers may be carried out in as realistic a manner as possible, all duties will, as far as practicable, be performed precisely as they ought if the assumed conditions actually existed.

In carrying out these exercises the following general rules will be uniformly observed:

(*a*) The opposing forces will be designated as the "Blue" and the "Brown." The former will be attired in the regulation uniform, with forage caps or campaign hats. The latter will wear brown canvas fatigue suits and campaign hats.

(*b*) Where topographical and road sketches are required, the scale will usually be three inches to the mile.

(*c*) All troops will march fully armed and equipped, and will carry ten blank revolver and ten blank carbine or rifle cartridges.

(*d*) All instructions issued for exercises will be marked in the upper left hand corner "Course of Instruction, Cavalry and Light Artillery School, Exercise No.—" (giving serial number of exercise). The instructions for those exercises in which the artillery participates will be marked "Combined Exercise No.—," etc. All reports, itineraries, sketches, etc., submitted pursuant to said instructions will be marked in a similar manner in the upper left hand corner, and be signed at the bottom. When reports are accompanied by sketches made in Field Note Books, a reference will be made on bottom of report showing in which volume of F. N. B. the accompanying sketch will be found.

(*e*) An officer will be detailed to accompany each command as topographical officer. He will prepare a hasty sketch of the field of operations and deliver it to the senior umpire.

(*f*) Before leaving the Post the cartridge belts of all soldiers who are to take part in any exercise will be carefully inspected to see that no ball cartridges are mixed with the blanks. Whenever exercises are to begin at designated positions a second inspection will be made upon arrival at positions. *These inspections must be made with extreme care and by officers.*

(*g*) Officers and non-commissioned officers in all exercises will see that patrols, flankers, scouts, videttes, etc., are properly instructed and take advantage of all cover available.

(*h*) Officers must appreciate that it is their duty to avail themselves of all cover possible for their commands. Whenever necessary to expose them it will be done at a fast pace and in the most favorable formation.

(*i*) Spectators must not go ahead of the advance party of either side, nor gather in positions liable to mislead combatants.

(*j*) Commanding officers should not specify, except in general terms, where and how batteries should be brought into action. The exact spot and manner should be left to the battery commander, upon whom rests the responsibility for the proper handling of his battery and for violation of proper principles.

(*k*) During the exercises, when the artillery is firing on cavalry, a yellow flag will be displayed by the battery; a white flag when firing on dismounted cavalry or infantry, and a red one when firing on the enemy's artillery.

(*l*) In case troops are ruled as "out of action" by the umpires, before the termination of the exercise, they must proceed as rapidly as possible to take position with their reserve or battery, sending notice without delay to their commanding officer of the action taken. While proceeding to the rear under these conditions a white flag or handkerchief will be displayed.

(*m*) To give juniors an opportunity to command, officers will sometimes be "excused from participation." In all cases officers so excused, unless detailed as umpires, will attend as spectators.

(*n*) Reports, comments, maps, etc., pertaining to the exercises will be kept in the office of the secretary of the school. All are invited to examine and read them.

(*o*) All members of the command are positively forbidden to carry on their persons or with field pieces, or to have in their possession, any fixed ammunition or ball cartridges of any kind whatsoever, while taking part in or attending the field exercises.

Umpires.

(*a*) Each umpire will wear a white band on his left arm.

(*b*) Firing by opposing parties will be discontinued at sixty yards, and umpires will then make a decision.

(*c*) Umpires should be early on the scene in cases of cavalry attack, as otherwise it might be difficult to judge. In adjudging the result, the situation of the enemy, the execution of attack, and the consideration of the respective strengths is important.

(*d*) Whenever phases of the exercise require suspension of the movements in any part of the field the umpire recognizing the necessity will at once cause a trumpeter to sound "Cease firing," "Halt," "Attention." The signal will at once be taken up by the other trumpeters belonging to the same body of troops, and all concerned will cease firing, halt, and remain in their positions until the signal "Commence firing," "Forward," is given. The signal for the suspension and resumption of movements will be sounded as above, whether there be any firing or not.

(*e*) The actual collision of opposing forces must be prevented under all circumstances. When an exercise has reached the stage just preceding the crisis of the fight, it is evident that nothing short of the actual conditions of battle could really decide the question of victory or defeat. At this stage the signal for a suspension of

movements will be given by the commandant of the school or one of the senior umpires, and the relative dispositions of the opposing forces will be carefully noted. The exercise will then be at an end.

(*f*) Umpires, while endeavoring to give correct decisions, should give them promptly. This rule is necessary to avoid awkward pauses and misunderstandings in the course of the exercise.

(*g*) Whenever a condition is brought about or action is had which, in real warfare, would be productive of results, a decision should be rendered accordingly by an umpire. If several umpires meet, the senior in rank should give the decision.

(*h*) Decisions of umpires being made by authority of the commandant, must be accepted. Should an officer deem them erroneous or unfair, he may appeal, giving his reasons at assembly, for discussion.

(*i*) Umpires should carefully avoid giving information or advice or making suggestions to combatants. They should not precede the advance parties of either side, and should also be careful not to disclose the locality of troops attempting concealment, by exposing themselves in that vicinity. Though umpires are attached to a particular side, they should not in their reports refer to "our" side or "their" side. To avoid confusion, the words "Blue" and "Brown" should be used to distinguish the opposing forces.

(*j*) The chief umpires will assemble their subordinates for discussion and report at such time during the afternoon of the day of an exercise as they may elect. The chief umpires will submit written reports to the secretary of the school before tattoo of the same day.

Patrols.

(*a*) If fired upon within 150 yards by dismounted men, scouts, or the members of a patrol in advance, riding rapidly or otherwise, will be considered captured.

(*b*) Should a deployed patrol be fired upon within 200 yards by a dismounted patrol on its flank, the flanker on the side nearest the enemy will halt and be considered captured. Unless much superior in numbers to the attackers, the remainder of the patrol will retire rapidly. In other cases the result and loss will be determined by the umpires.

Cavalry.

(*a*) Cavalry charges must stop at eighty yards from the enemy.

(*b*) Cavalry standing to receive a charge must be declared defeated.

(*c*) Should cavalry, although somewhat inferior in strength, succeed in delivering an attack upon cavalry while deploying, it should be judged victorious.

(*d*) In a cavalry *vs.* cavalry charge, no maneuvers should be made so close to the point of contact as to endanger the steadiness and order necessary in the delivery of the shock.

(*e*) In cavalry *vs.* cavalry, of comparatively equal strength, and in proper formation, the victory should belong to the side last bringing up a formed reserve.

Dismounted Cavalry or Infantry.

(*a*) When exposed to a dismounted or infantry fire which is less than 800 yards away, bodies of cavalry can appear in attack formations only. Any flank movement made in the open, without cover, when so exposed, must be decided to the disadvantage of the cavalry.

(*b*) When unprepared and attacked by cavalry on the flank, dismounted cavalry or infantry, even though somewhat superior in strength, should be considered defeated, provided the attackers be not discovered until they are within 400 yards.

(*c*) If, before beginning to fire, a dismounted cavalry or infantry force, even though somewhat superior in strength, allows a cavalry opponent to attack in line within 300 yards, the advantage ought ordinarily to be awarded the mounted party. A screened approach and surprise is an important element.

(*d*) If a well directed and sudden volley be delivered at short range, by dismounted cavalry or infantry under cover or concealed, it should demoralize the party surprised to a great extent.

(*e*) Over a zone swept by dismounted fire at less than 800 yards, troops can move backward or forward and in attack formations only. An uncovered halt made for any length of time within this zone would necessitate an umpire's decision.

(*f*) When a flank is turned the defenders must fall back, or execute a change of front, before the attacking party has delivered a heavy fire at a range of 500 yards or less.

Artillery.

(*a*) Cavalry cannot move at a walk when exposed to the fire of artillery which is less than 2,500 yards away.

(*b*) When cavalry attacks artillery in front, the charge must be made in extended order, and the escort should be attacked at the same time by cavalry in close order.

(*c*) When on the move, or when unlimbering or limbering up, unprotected artillery is at the mercy of a cavalry attack. Guns in action have to fear for their unsupported flank.

(*d*) A column fired upon by artillery at distances less than 2,500 yards must deploy or move at a rapid gait. In applying this rule, umpires will make an exception when the terrain is such as to afford shelter to the troops, or to interfere with the effective use of the artillery.

(*e*) Artillery cannot come into action under dismounted or infantry fire within 800 yards, excepting under favorable circumstances; behind effectual cover, for instance. This, however, would not prevent it from accompanying advancing lines under cover of

their fire, to a decisive attack, but it should not be able to unlimber at all within 600 yards of an enemy.

(*f*) At ranges of 1,000 yards artillery can hold out against dismounted skirmish fire, but should strong skirmish lines succeed in approaching to within 600 yards of the guns, without the latter being sufficiently protected by dismounted cavalry or infantry and proper cover, the artillery must retire promptly or be judged unfit to move.

(*g*) Artillery can not move into action against artillery already in action at less than 1,200 yards, unless enabled to do so by effectual dismounted or infantry fire or by ample cover.

General.

(*a*) When approach is gained without discovery to within less than sixty yards, captures will be made by giving the command, "Halt!" "Surrender!" No shots will be permitted at such short ranges.

(*b*) All officers taking part in the exercises will be assembled at such time as the commandant may designate. The chief umpires will then make their reports, after which the exercise will be discussed. The commandant will designate the hour for adjutants and orderly officers to report for orders pertaining to the next exercise.

(*c*) Commanding officers of the opposing forces are expected to utilize the afternoon of the day preceding the exercise in the study of the problem, terrain, etc., and in the instruction of their subordinates in matters pertaining to the solution of the problem.

GENERAL SITUATION.

A Western Division (Blue) is operating against an Eastern Division (Brown) in the vicinity of Topeka. The Western force depends upon the U. P. R. R. for supplies.

SPECIAL SITUATION.*

Blue.

At 9 A. M., October 21st, Captain KERR with
Five companies Twentieth Infantry,
One squadron Sixth Cavalry,
Two batteries field artillery,
is guarding that section of the railroad from the Republican River bridge to Odgen. Assistance from other sections of the line cannot be counted on. A raiding party of the enemy is reported to have crossed the Big Blue River at Stockdale.

Brown.

At 9 A. M., October 21st, Captain MCCLERNAND is bivouacked at Four Mile Creek, acting under the following orders:

*Each commander was furnished with the "Special Situation" only for his own command.

FIELD ORDERS }
No. — }

ARMY OF THE EAST, TOPEKA, KANSAS,
October 20, 1896.

Distribution of Troops:

Captain MCCLERNAND,
Eight troops of cavalry,
One battery light artillery,

I. The communications of the enemy between Ogden and the Republican River bridge near Junction City appear to be weakly guarded.

II. Captain MCCLERNAND will disable the railroad for several days in that vicinity.

III. The detachment will report at headquarters not later than the fifth day.

By command of Colonel ARNOLD.

SCOTT,
A. A. G.

Memorandum.—The troops will move from Four Mile Creek at 9 A. M.

This duty is assigned to first and second squadrons and one battery light artillery.

ORDERS OF COMMANDER OF BLUES.

DETACHMENT ORDERS }
No. 1. }

IN THE FIELD NEAR FORT RILEY, KANSAS,
October 21, 1896—7 A. M.

Distribution of Troops:

Guarding railroad.
- First and second companies Twentieth Infantry.
- First battery of artillery and detachment of cavalry.

Reconnaissance.
- Advance cavalry.
  - First, second and third troops Sixth Cavalry.
- Advance guard.
  - Fourth troop Sixth Cavalry.

Main Body.
- Second battery artillery.
- Third, fourth and fifth companies Twentieth Infantry, less one-half section.

Rear guard.
- One-half section fifth company Twentieth Infantry.

I. A raiding party of Browns has crossed the Big Blue River at Stockdale probably with a view of destroying the railroad.

II. One company of infantry, a platoon of artillery and a detachment of cavalry will be posted so as to command the approaches to the railroad bridge over the Republican River, near Ogden monument.

A similar force will be posted on Sheridan Heights so as to command Three Mile Creek and the railroad as far as Ogden.

The Manhattan Road will be patrolled by cavalry from the bridge to Ogden. Small detachments of infantry will be placed on the bridge and at the culvert over Three Mile Creek. The remainder of the command will make a reconnaissance in force with a view of attacking the raiding party.

III. The troops will be in the places assigned at 9 A. M. this date.

IV. The train will be left with the first and second companies of infantry.

V. I will be with the advance cavalry.

J. B. KERR,
Captain Sixth Cavalry,
Commanding Blues.

ORDERS OF COMMANDER OF BROWNS.

DETACHMENT ORDERS } FOUR MILE CREEK, FORT RILEY RESERVATION,
No. 1. } October 21, 1896 — 8:30 A. M.

Distribution of Troops and Order of March.

Advance guard.

Two troops first squadron, to be selected by squadron commander.

Main body.

Third and fourth troops first squadron.

First, second and third troops second squadron.

Light battery.

Fourth troop of second squadron.

I. The railroad communications of the enemy between Ogden and the Republican River bridge are reported to be weakly guarded.

II. This command will endeavor to so damage the railroad as to render it useless for several days. If practicable a small detachment will be sent stealthily to destroy the Republican River bridge with dynamite cartridges.

Should the enemy not interpose the main column will move toward Three Mile Creek. If the enemy appear a demonstration may be made towards the Republican River, but the commander will avoid unnecessary separation and he will retire on the main body in good time and without awaiting orders. Advance guards, flankers and rear guards will be vigilant. Rear guards are especially important, and the rear troop will look to this, for if the enemy discover our presence and is able to assemble sufficient force he may endeavor to cut off our retreat.

If not in position on our line of retreat the enemy will not be attacked in force except under the most favorable conditions. If separated from the main body it is intended to attack his cavalry vigorously, but at all times subordinate commanders will endeavor to avoid becoming so seriously involved as to bring on a general engagement unless so directed by the C. O. If the railroad be reached, the bluffs to the rear will be held by strong detachments.

The importance of cover must not be forgotten; every officer will be on the alert and watch for both artillery and infantry fire; our line of retreat will be preferably towards Riley Center via the lane immediately west of the Milk ranch and the commander of the leading squadron will throw out two troops to cover the movement of the pack train. If this route be not feasible, then by the Estes gate and Governor Harvey road, and as a last resort towards Clay Center, via the Republican River road.

Whenever necessary, the advance guard will promptly provide for the passage through wire fences.

III. The main body will move at 9 A. M.

IV. The pack train, under charge of the guard, will approach under cover to the vicinity of the Estes gate, and will join the main command on its retreat at the first opportunity.

V. The commanding officer will be with the main body.

By order of Captain McCLERNAND.

S. P. ADAMS,
Second Lieutenant, First Cavalry, Adjutant.

REPORT OF UMPIRES WITH THE BLUES.

The force of Blues consisted of one battalion Twentieth Infantry (five companies), one squadron Sixth Cavalry, and Batteries "A" and "F," Second Artillery, all under the command of Captain J. B. KERR, Sixth Cavalry.

Captain KERR's command was distributed in accordance with his Detachment Order No. 1.

Soon after 8 A. M. Captain KERR marched his squadron of cavalry, three companies of infantry and one battery of artillery, up One Mile Creek, and at 9 A. M. took up a position near Morris Hill, his line facing north and covering the Estes road. At 9:15 information was received that two troops of Browns were moving east on the Estes road; at 9:20 firing of the advance guard was heard on the Estes road; at 9:30 main force of Browns was observed marching east on the divide; at 9:40 scouts of the Browns appeared to the right of the Blues' position; at 10 the Browns appeared in considerable force on Estes road; at 10:08 the main force of the Browns was apparently moving east. The Blues then moved from their position on and near Morris Hill and marched to Sheridan's Bluff and took position on Sheridan Heights facing north and northeast, commanding Forsyth's Drive and the railroad in the direction of Ogden. This position had been occupied since 9 A. M. by one platoon of artillery and one company of infantry belonging to the Blue force. Captain IRONS, commanding the company of infantry, had placed a detachment at Three Mile Creek trestle, some distance east of this position. At 10:40 the Blue artillery fired on a detachment of Browns marching in column of fours at 3,000 to 3,500 yards, coming over the divide and moving towards the railroad. At this time three troops of Blue cavalry and three companies of infantry, in great measure concealed by the ridge, moved to their right, to a position covering Three Mile Creek trestle. At 10:50 four shots were fired by artillery at a troop of Browns, range 1,400 yards The troop was marching apparently in column of fours; injury to Browns probably small. At 10:55 Brown artillery opened fire on the Blue battery at 3,000 yards. The six guns of the Blues concentrated their fire on Brown battery. At 11:55 Brown battery fired upon Blue infantry marching as skirmishers near the crest of the ridge occupied by the Blues. Three companies of Blue infantry and three troops of cavalry dismounted were then marched to the

right to cover the trestle, the mouth of Three Mile Creek valley and the railroad in the direction of Ogden. At 11:12 the Browns appeared in considerable force near the mouth of the valley and was exposed to the fire of artillery at 1,500 to 2,500 yards, infantry at about 700 yards and dismounted cavalry at short range. Several small detachments of the Browns marched to the vicinity of the railroad. These detachments were ruled out.

Six or eight men of the Browns succeeded in reaching the culvert east of the trestle without being fired upon at short range. They could possibly have dynamited this culvert. Finally all the force of the Browns that had advanced to the mouth of Three Mile Creek valley were ruled as having been so much disabled by the fire of artillery, infantry and dismounted cavalry as to be incapable of further efficient action at this time.

The railroad bridge over the Republican river and approaches were guarded by a company of infantry and platoon of artillery, posted on the ridge in the vicinity of the Ogden monument. A half section of infantry was placed near the bridge. Nothing appeared excepting four Browns mounted; two volleys were fired at them by the company of infantry, range about 800 yards; they dispersed and two of them proceeded in the direction of the bridge, and in passing the half section of the infantry near the bridge twenty or thirty shots were fired at them, the last shots at twenty yards distance. It was considered that the attempt on the bridge was futile. At 11:48 a troop and a half of Blues and a platoon of Blue artillery came from the extreme right of the Blues, and took position on the ridge near the Ogden monument. This terminated the maneuvers. So far as observed it was not discovered that any material injury had been done to the railroad by the Browns.

REPORT OF UMPIRES WITH THE BROWNS.

The Brown force was assembled in a concealed position on Four Mile Creek in the vicinity of DIXON'S ranch, where the orders of the commander hereto appended, marked "A," were published.

The main body moved at 9 A. M., passing eastward through the wire fence on the Governor Harvey road.

Videttes were thrown out; the squadron of Captain KINGSBURY made a demonstration to the right, developing a small force of Blues. At this time the squadron of Captain SIBLEY was directed to move through the low ground towards the left, swing around across the Milk Ranch road and endeavor to gain the line of Three Mile Creek. This was done, the battery following, and subsequently they were joined by the squadron of Captain KINGSBURY after the demonstration referred to was withdrawn. The enemy's scouts were observed on Morris and the adjacent hills, but no considerable force of Blues was observed until the Brown force reached a point north of Forsyth Drive, about three-fourths of a mile west of Three Mile Creek, when they were seen on the eastern portion of Pawnee Heights and the

lower bluff on Three Mile Creek. One troop under Lieutenant ARNOLD was here directed to proceed under cover to the line of Three Mile Creek to endeavor to reach the railroad, and shortly after another troop under Lieutenant SUPLEE in support of this movement. Infantry fire was then opened by the Blues on the low bluff immediately west of Three Mile Creek, and the Blue artillery opened at 10:40.

The Brown battery was now brought up under cover and fire opened upon the two positions of the Blue battery, which were taken partly in flank, and which did not reply for some minutes. Lieutenant FURLONG with his troop had received orders to cross Three Mile Creek in the vicinity of WHITE'S ranch and if possible, without exposure, gain and destroy the railroad in the vicinity of Ogden; this was accomplished at 11:23, as per report appended, marked "B."

Lieutenant ARNOLD reached the mouth of Three Mile Creek by a circuitous route north and outside of the reservation without apparently attracting any attention at 10:03. Here he dismounted and led through the thick brush to the open ground, where, after lying concealed for ten minutes and sending out individual scouts, some of whom were captured, he made a dash across an opening of 200 yards, in column of twos at a run with fifty yards between twos. In this dash he passed under fire of a force of Blues concealed to his right at 150 yards, and was ruled out with all his men, about one-half troop. The remaining men of this troop (scouts and videttes) made their way in the brush to the culvert 300 yards east of the bridge over Three Mile Creek and destroyed this culvert without opposition; here was met two men of Troop "C," Second Cavalry, who had previously wrecked the same culvert. These twelve men then followed the railroad towards Ogden one-fourth of a mile, and disabled the road again under cover of a bank, and from this bank delivered later a destructive fire at a company of Blues scaling a bluff at 300 yards distance.

This company of Blues (Captain FOSTER) after scaling the bluff, where he lost ten per cent., received a fire from ten men of "K," First Cavalry, on his left flank at 700 yards, refusing one platoon on his left. Captain FOSTER received an enfilading fire at 200 yards from Troop "C," Second Cavalry, which had crept up unobserved on the bluffs in his rear; here he lost fifty per cent. of his remaining men. The remainder of the company fell back to the ravine below, suffering from the fire of the Browns on the railroad. He was followed up by Lieutenant SUPLEE'S Troop "C," Second Cavalry, and was adjudged to have lost his remaining men. As it was thought that a portion of the Brown force had either succeeded in reaching the railroad or had destroyed it, it was decided to withdraw the remainder, and recall was sounded at 12:05 P. M.

From the time of starting from Four Mile Creek the force was kept well under cover, and is believed not to have been seen except perhaps for a distance of 150 yards, at a point slightly west of the

Milk Ranch road, where the battery was masked by the cavalry column.

It is thought that the Brown battery, or at least one or two guns, should have been left in their last position, for the range having been obtained two excellent targets presented themselves, one a detachment of cavalry and infantry on a knoll in the middle of the valley below, and again at least two troops of cavalry moving in column on the bluffs to the right, about 2,200 yards away. These were not in any way molested.

It is uncertain as to how long the railroad would have been disabled by damage done.

OUTSKIRTS OF OGDEN, 11:40 A. M.

Captain McClernand, Commanding Raiding Party.

SIR:—Pursuant to your instructions I have succeeded in reaching the railroad; reached it at 11:23, quarter mile west of Ogden.* Crossed Three Mile Creek unobserved, and have been unmolested. Got wagon here. Blew up railroad track near river; got farm house wagon and took rails short distance to river and dumped them in. Destroyed enemy's supplies collected here. After doing all damage possible will join you by road running north from Ogden, coming by way of Milk Ranch. The Blue forces are on this side of Three Mile Creek, and heights on this side are unobserved.

Respectfully, FURLONG,
Commanding Platoon.

This exercise, illustrating a detachment of Blues (five companies of infantry, one squadron of cavalry and two light batteries artillery) guarding the railroad from the Republican River bridge to the stone fence south of Ogden, a distance of a little over five miles, and a detachment of Browns (two squadrons of cavalry and one light battery of artillery) acting as a raiding force attempting to reach and destroy a section of the road, has proven to be one of much interest, and it is believed that all have gained some useful information from a professional standpoint which it will be well to remember.

It is also believed that young officers can be benefited by a further study of the problem on the map, each forming his own ideas of the best solution for both attack and defense.

It is believed that the positions taken by the Blues covered the line of the railroad quite effectually, and that the troops were so disposed that any portion of the line could be reinforced in time to avert any serious disaster. The Brown force was kept well under cover and took the best possible advantage of the terrain to make a wide detour, passing the entire front of the Blues and to a point near the right flank, which was nearly at right angles to the front, without being exposed. From this point the effort was made to reach the railroad, with partial success, as reported by the umpires. It is impossible to say what damage the railroad would have received as the nature of the fire action and contact of the troops was such that only the actual conditions of warfare with the element

*The situation required the guarding of the railroad only as far west as the reservation line at the eastern edge of the village of Ogden.

of time considered, could have determined this question. It is thought that patrols and scouts could have, at certain stages of the exercise, been utilized to better advantage by getting nearer the enemy, watching carefully any shifting of positions and promptly reporting it. It is a question worthy of consideration whether the Blues acted wisely in abandoning entirely their position on Morris Hill, leaving this commanding position subject to occupancy by the enemy. The railroad from Three Mile Creek to the stone fence seemed to be pretty well enfiladed by the artillery on Sheridan Heights, and it is an open question whether or not a battery so placed could not protect that entire portion of the railroad.

As a whole the exercise was very satisfactory.

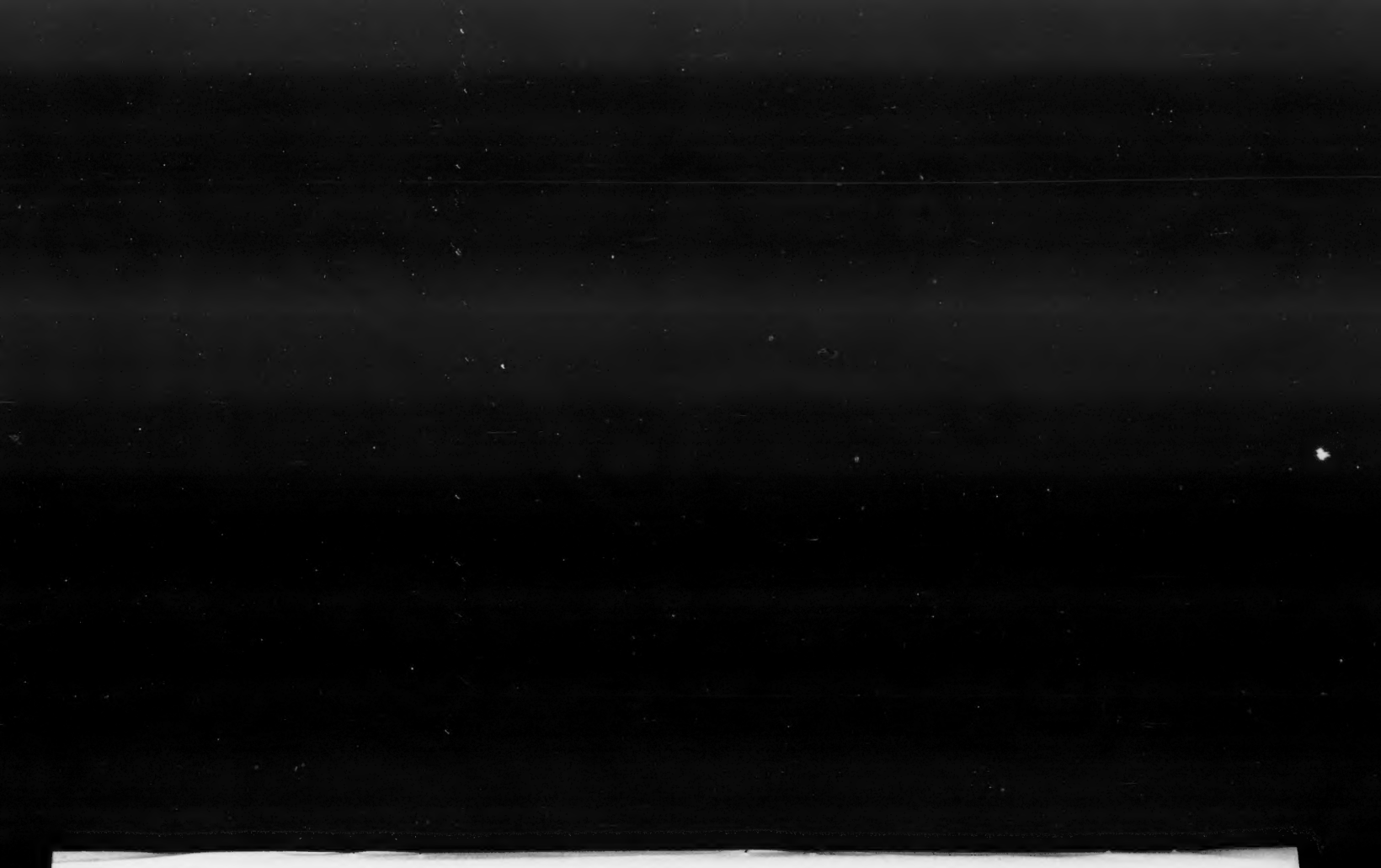
A. K. ARNOLD,
Colonel First Cavalry,
Commandant.

"CAVALRY FIELD HOSPITALS": A SCHEME FOR RENDERING FIELD HOSPITALS CAPABLE OF ACCOMPANYING A CAVALRY FORCE IN THE FIELD.

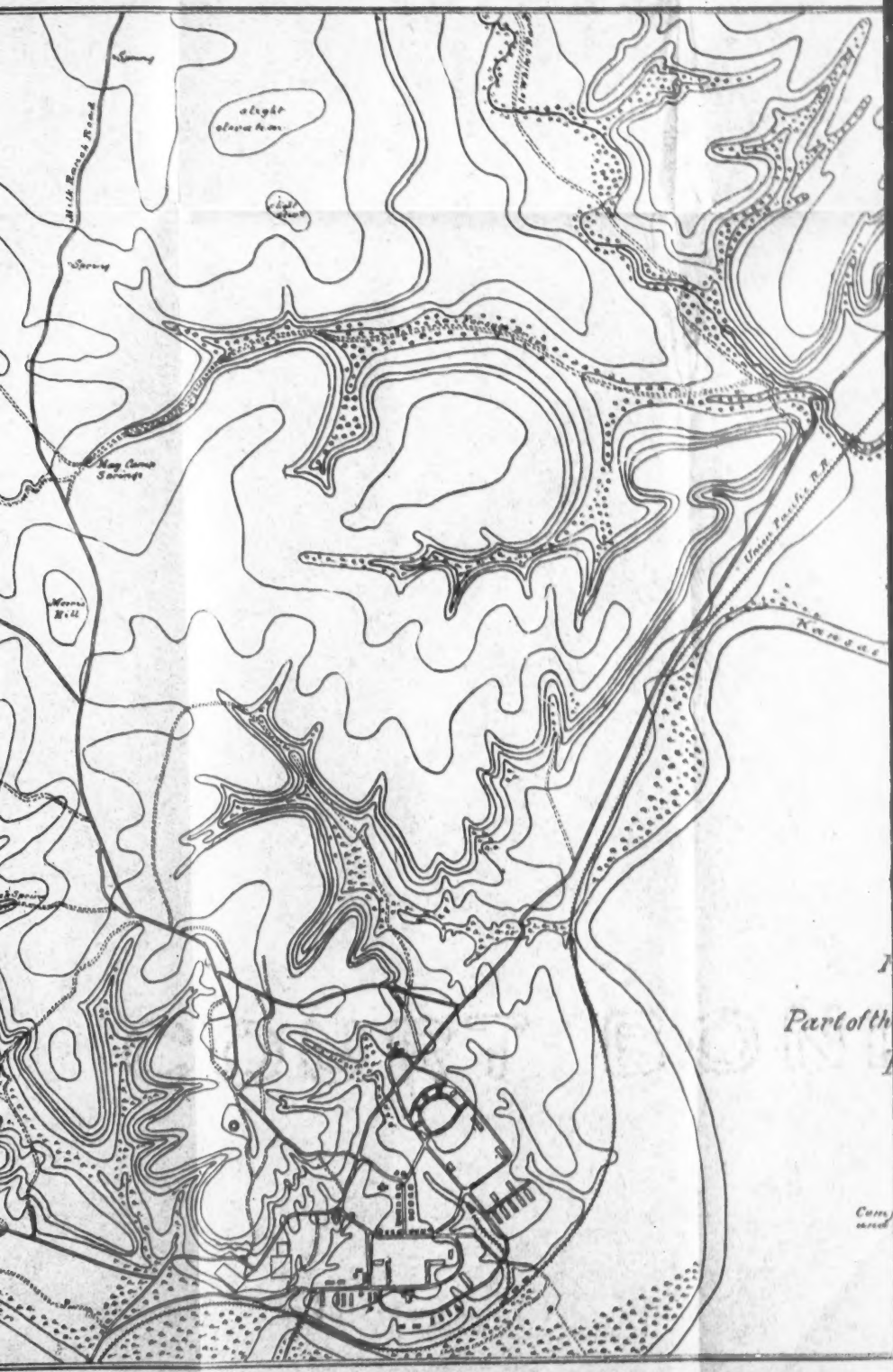
The necessity for consideration of special medical arrangements, both as regards material and personnel, for masses of cavalry acting independently of an advancing army, has not been sufficiently recognized in existing regulations for field service. It is true that, to a very limited extent, the principle has been admitted that a regiment of cavalry or a horse artillery battery does require some modification of the material supplied to other more slowly moving branches of the service, inasmuch as, when on the march or on field service, each of these units carries with it a specially designed "cavalry bag" of surgical necessaries as part of the regimental medical equipment.

But beyond this there would appear to be no recognition of the immensely important fact that the celerity of movement of the mounted branches and consequent increased distance covered by them are factors which necessitate a greatly modified ambulance system to that which suffices for the relatively slowly moving mass of an army. That this problem has not presented itself in a more pressing form, and has not been satisfactorily dealt with already, depends no doubt on the fact that, in the recent frontier expeditions, such as Waziristan and Chitral, there have been no cavalry operations on a scale sufficient to draw attention to the defects of the present system.

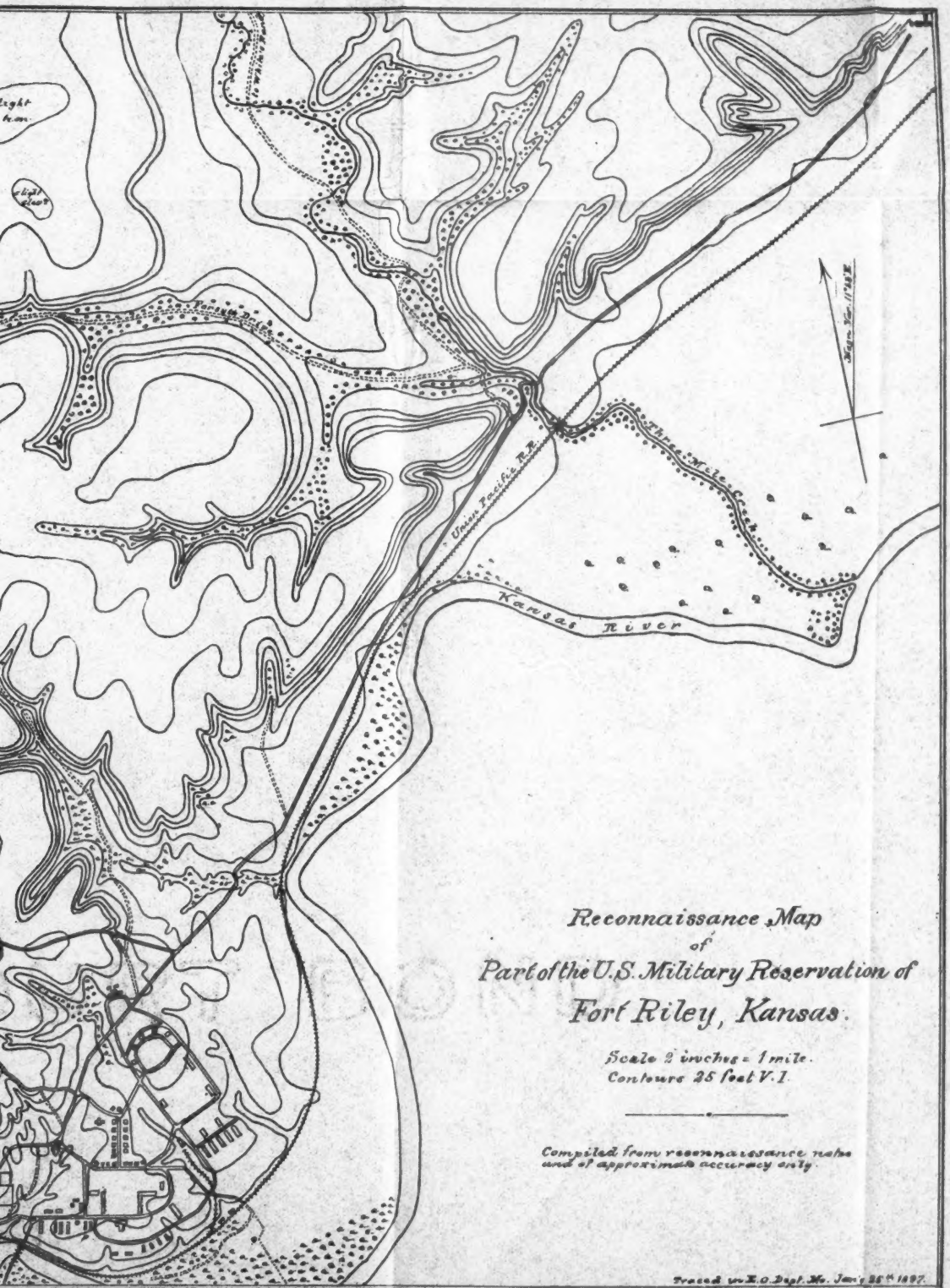
Now, it is laid down in Cavalry Drill, Volume II, that at the commencement of operations, long distances will have to be covered at a rapid rate by the body of cavalry, which is sent on in advance of the army; and, further, that several days' march may separate the cavalry from the main body. This will apply equally in the case of a cavalry division in a European campaign, and of a single brigade operating, for example, as a screen to an infantry division



Reservation Land
Fairbury Station
Filley Road
slight elevation
slight elevation
slight elevation
Rock Spring
Milford Road
Republican
River


Spring
slight elevation
Spring
Union Pacific R.R.
Kansas
Part of the

Reservation Line
Mill Road
Mill Road
Spring
Spring
slight elevation
slight elevation
slight elevation
slight elevation
slight elevation
Mary Camp Springs
Morris Hill
Rock Spring
Republican River
Welfred Road
Geo Murray Road



Reconnaissance Map
of
Part of the U.S. Military Reservation of
Fort Riley, Kansas.

Scale 2 inches = 1 mile.
Contours 25 feet V.I.

Compiled from reconnaissance notes and of approximate accuracy only.

Traced in E.O. Dept. Mo. June 25th 1897.

advancing through an uncivilized country beyond our frontiers. In either case such a force is bound to be independent and to act independently of the main body in the matters of transport and commissariat, and in its ambulance arrangements.

Moreover, the front of such a cavalry screen will extend for many miles, and the screen itself will consist of units (whether squadrons or regiments) separated from each other by appreciable distances; so that the problem of affording even temporary aid to the casualties, which must occur, is a far larger one than appears to have been recognized when the equipment tables now in force were compiled.

Recognizing to the full that, in the case of advancing cavalry, it may be necessary to sacrifice men who are sick and wounded to the exigencies of the service, and this to a greater extent than in the case of the more slowly moving infantry, the question still arises, How far are the arrangements at present laid down in any degree adequate to the fulfillment of the functions of the medical services, viz: rendering aid to the greatest number possible of wounded and sick, sending them back to the rear, and relieving the fighting machine of the encumbrance entailed by the mere existence of men in other than a normal state of health?

To answer this question, let us consider briefly the medical establishment which would accompany a brigade consisting of one British regiment, two native regiments and one battery royal horse artillery.

Each unit would have its regimental establishment, consisting of one medical officer, one subordinate, a very limited quantity of surgical equipment, and a dooly (two doolies in the case of British troops).

It is expressly laid down that this establishment is for the treatment of slight cases, the administration of first aid regimentally, "pending transfer to the field hospital."

There would be also two field hospitals, one for British and one for native troops, for each cavalry brigade.

The personnel equipment of these may be roughly tabulated as follows:

TABLE I.

Personnel and Equipment.	*British Field Hospital.*	*Native Field Hospital.*
Medical officers	4	4
Assistant surgeons	8	
Hospital assistants		8
Ward servants, etc	47	19
Kahar establishment	About 129	About 129
Ambulance mules	80	80
Ambulance drivers	About 28	About 28
Surgical equipment	112 packages.	92 packages.
Pakhal mules	4	4

Admirable as this establishment is, both as regards quantity and quality of its component parts, it is evident that its serviceability must depend on its power to fulfill the functions which are its very *raison d'être* and these at the time and place where they are required.

Can any one who has seen a field hospital on the march, with its painfully elongated and heterogeneous line of doolies and kahars, ambulance mules and transport mules, followers of every class and laden camels, moving along at a pace which, slow at first, becomes hourly slower,—can any one, who has seen this sight conceive that such a body, however well equipped in itself, could ever be other than an encumbrance to a force, the success of whose movements frequently depends on the rapidity of its advance? How could such a field hospital keep up with a brigade advancing perhaps twenty miles a day for a number of days?

And if this argument applies to the main body of the brigade, how much more is it apparent in the case of the regiment which is thrown forward to supply the advanced squadrons and patrols several miles further ahead, and which daily perhaps comes in contact with an active enemy.

With the best endeavors on the part of medical officers it is on the face of it, *impossible* that under the present system adequate surgical assistance shall be forthcoming when needed.

But is it to be admitted that the mere fact of a body of troops being rapid in movement is to debar that assistance being afforded to its sick and wounded, to afford which the medical services exist? Not at all. The present system must be altered to suit the circumstances of the case. And this can easily be done.

In the first place, there must be a greatly extended recognition of the principle that the medical arrangements for a cavalry force *must* necessarily be far more mobile than those which amply suffice for infantry. In fact *cavalry field hospitals* must be organized, differing from the ordinary field hospital in every particular requisite to insure the great essential, mobility. If this can be done, as seems possible, without any increased expense, so much the better; but even were considerable outlay incurred to effect the purpose, better that outlay and efficiency than blind adherence to a sealed pattern, and failure at the crucial period.

Suggestions for the Cavalry Field Hospital.

1. The present arrangement into four independent sections is an admirable one. However, since with the existing scale of equipment, any particular section detailed to accompany a small force would be seriously hampered by its large mass of stores, etc., even with the reductions (to be detailed) which might be made in these stores, it would be necessary to leave the more cumbersome articles with the heavy baggage of the brigade. Any part, therefore, of its equipment over and above absolute necessaries should be left in charge of one section, which would throughout act as a "base" to

the other three, would act as a reserve of drugs, etc., for them, would as far as possible relieve them of sick and wounded, and leave them free to accompany any unit, such as a squadron or a regiment, when on detached duties. This "base" section could either accompany the main body of the brigade, or come on, as rapidly as possible, with the baggage.

2. *Ambulance Transport.*—This would appear to be the best place to consider this most important question, more especially for the reason that creation of a mobile cavalry field hospital at no extra expense to government is rendered possible only by altering the whole system as at present existing. There are two available modes of transport in a field hospital; for "lying-down cases" twenty doolies are provided, and for such as can ride, eighty mules equipped with a new pattern of ambulance saddle. With a body of troops on the march, the majority of casualties will consist of cases of fever, dysentery, and collapse from exertion or heat. These will be carried in doolies for the obvious reason that they could not ride. Besides these, we must consider the possibility of men being wounded, or thrown from their horses, and having to be carried.

It may fairly be concluded, therefore, in the case of a cavalry force, that the majority of cases requiring assistance will be lying-down cases. From march to march the sick of previous days will also have to be carried, until arrangements can be made for sending them back.

To do all this a field hospital has twenty doolies. Each dooly is carried by six kahars, and the total establishment of these is 129.

Now, the dooly-bearer, or kahar, is popularly believed to be an untiring, patient, and, in his own way, skillful beast of burden. This theory has as much truth as most such popular beliefs.

When the Waziristan force was mobilized, the greatest difficulty was experienced in raising kahars, even after depleting regimental hospitals down country. Men were swept in from the bazaars of Mooltan, Ferozepore, and similar places, and after passing a medical examination, were set to carry doolies. Many of these men, when questioned by the writer, admitted that the work was completely new to them. Add to this that even the old-time regular kahar was innocent of the very rudiments of ambulance work proper, and the result may be imagined.

It is in the personal experience of the writer that the average rate of progression of a laden dooly is certainly not above two miles an hour, and this with halts every quarter of a mile or less to change shoulders; however, the kahars frequently either stumble, or from sheer exhaustion let the dooly drop. This occurred, in the case of the writer, twenty-three times in one march.

It is obvious that lying-down accommodation must be provided; so that the dooly establishment would have to be replaced by some other means of transport. This could easily be done.

The establishment of doolies is a very costly item, as the following table will show:

TABLE II.

Cost of Dooly Establishment for a Six Months' Campaign.

		Rs.
1.	Cost of free kit for 129 kahars at commencement at (roughly) Rs. 3 a head	387
2.	Pay for six months at an average of Rs. 8 a month (including batta)	6,192
3.	Cost of free rations for six months at an average of Rs. 2-8-0 monthly	1,935
4.	Pensions of drivers } No estimate possible.	
5.	Transport of drivers }	
	Total	8,514
	Or a monthly average of	1,418

This establishment, then, adapted to carry twenty doolies, costs Rs. 1,418 a month, or Rs. 8,514 for a campaign of six months' duration.

In place of these, substitute mules, carrying litters. A cavalry baggage mule does day after day carry as much as three maunds of kit, and this without stumbling; and such a mule will cover long distances day after day, at twice the pace of a laden dooly, on the most meager rations. Compare the cost of substituting mules for doolies, premising that each mule carries a pair of litters.

TABLE III.

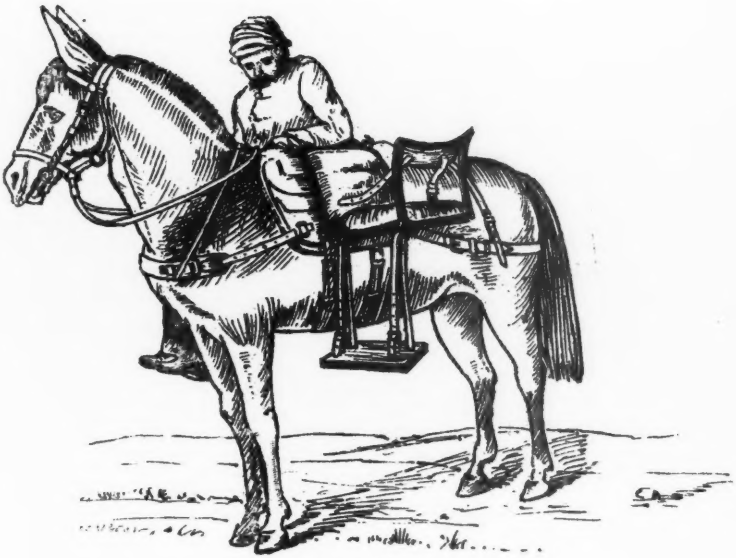
Cost of Litter Mule Establishment for Six Months.

		Rs.
1.	Rations of ten mules at, say, Rs. 12 per month	720
2.	Pay of five drivers at Rs. 9, including batta	270
3.	Rations of five drivers at Rs. 2-8-0	75
4.	Free kit of five drivers at commencement of campaign at Rs. 3 a head	15
5.	Pensions of drivers. }	
6.	Transport of drivers. }	
	Total	1,080
	A monthly average of	180

Supposing this mule establishment to be doubled, *i. e.*, twenty mules carrying forty litters, with ten drivers, the monthly upkeep should still only be about Rs. 360 as against Rs. 1,418 for the maintenance of twenty doolies, and the pecuniary saving would be *Rs. 1,058.*

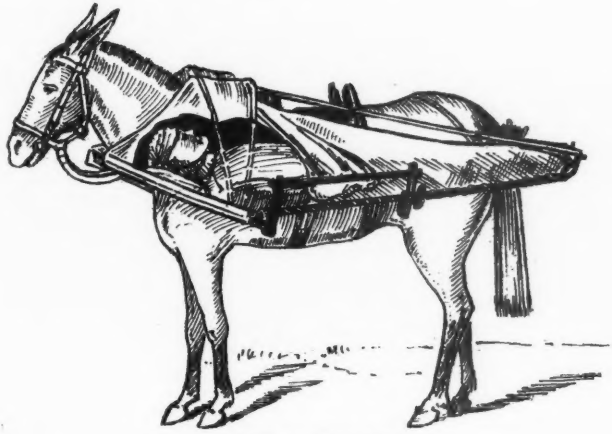
The *Mark III* litter weighs 106 pounds (roughly $1\frac{1}{4}$ maunds) per pair. It is evident that the mule which can carry a laden pair of these, or about five maunds, must be of a finer stamp than the ordinary undersized commissariat mule; mules of the type required, however, are to be found in every mountain battery, and the limited number required for a few cavalry field hospitals should not be difficult to obtain.

As to the initial expense of purchasing the mules. It is shown above that over Rs. 1,000 would be saved monthly by the suggested alterations. In six months a sum of Rs. 6,000 would have been



I. CACOLET FOR CARRYING WOUNDED MEN,

Fitted with cushion, back and waist straps, slings and foot boards (weight fifty-six pounds per pair).



II. HORSE OR MULE LITTER,

Fitted with straps, hood, pillow and apron.
(Weight, 106 pounds per pair.)

saved. Now a mule of the type required can be purchased for from Rs. 400—500. Taking the higher price, the saving alone would buy twelve out of the suggested twenty; and it must be remembered that at the end of the campaign these mules would be available for ordinary transport work. So that in the long run government would gain on the transaction.

Finally, of the eighty ambulance mules already allowed, a proportion at least might be equipped with *cacolets*. Many cases of injury occur where men cannot ride, and yet are not bad enough to require a dooly. Cacolets for these would be invaluable; and here again, as each cacolet mule would carry two men, if we can obtain the few larger and more powerful mules necessary, we should increase the carrying capacity of the hospital.

To sum up, the following is the alternative now suggested, and by its side is shown the present establishment:

TABLE IV.

Comparative Table of Existing and Suggested Ambulance.

No. 1. Existing Regulations.		*No. 2. "Cavalry Field Hospital."*	
1. Doolies..... 20 Bearers.....129	Carrying 20 sick.	1. Litter mules..20 Drivers 10	Carrying 40 sick.
2. Ambulance mules... 80 Drivers..... 24	Carrying 80* sick.	2. Ambulance mules—	
		A.—Cacolet mules.....40	Carrying 80 sick.
		B.—As in No. 1†.....40	Carrying 40 sick.
		80	120
Total.....100 sick.		Total.....160 sick.	

* All these would be riding cases, *i.e.*, on the ordinary ambulance saddle.
† Riding cases, as in No. 1.

So that the cavalry field hospital would be able, in an extreme case, to deal with 160 sick and wounded, and each "flying section" recommended above, with forty cases. Finally, in the case of a troop being detached, it would be possible to send with it at least a litter and cacolet mule, whereas a dooly would be conspicuous to the enemy, slow, unwieldy and invariably lagging behind.

3. *Personnel.*—There are too many followers in a field hospital. Though the substitution of ten drivers (for the litter mules) for the 129 kahars would make a very great difference, the defenselessness of the hospital would still exist.

The drivers should be enlisted soldiers, exactly like those in mountain batteries. Had there been fifty armed drivers in the two field hospitals at Wano, instead of 250 defenseless followers, the mortality would have been less and the Waziris would not have

been able to cut up half the hospital transport as they did. The actual expense of having soldier drivers would be very little more than that of the same number of commissariat drabies; while in peace time they could be fully and most usefully occupied in learning stretcher drill, "first aid," etc. It is, perhaps, unnecessary here to point out that a kahar is not trained in any way; and yet on him will devolve the duty of lifting sick and wounded men into doolies.

The whole of the drivers, whether ambulance or transport, would, if armed, form a most useful defense to the hospital; and from the fact of men being soldiers there would be no chance of their not being forthcoming in action, as occurred at Wano, when, after the first volley into the hospital camp, not a kahar could be found, and the medical staff had to bring in the wounded.

4. *Equipment.*—The latest alterations in the equipment of field hospital are excellent in every way. The total number of packages has been reduced, and heavy drugs have been in many cases replaced by lighter or less bulky ones. If only this were extended, and the excellent "soloids," "tabloids," etc., obtainable nowadays, more generally substituted for made up "tinctures," etc., a still greater reduction in weight could be effected.

If litter mules were introduced in place of doolies, a surgical haversack or field medical companion could be carried by each, and boxes No. 3 and 4 done away with.

The stationery is on an unnecessary liberal scale; and two No. 12 boxes, instead of four, would amply suffice for the whole four sections. The same applies to box No. 11. Again, as flying sections could not carry with them all the clothing and blankets allowed in boxes 13 and 17—22 (British field hospital) and 15—19 (native field hospital), the quantity supplied should be halved, two of each only being supplied. In this way, without any loss in efficiency, the total number of packages would be reduced to seventy-two in the case of a British and sixty in a native field hospital.

The tentage for a cavalry field hospital ought to be certainly not more than half the amount now allowed, if the amount of mule transport is not to be very largely increased. A British hospital contains some thirty tents for sick, and a native hospital nineteen, besides some dozen tents for subordinates, drivers, kahars, etc. Tents for the sick could be halved in number, and, if necessary, regiments could temporarily supply tents for the use of their own sick. This, however, is merely a matter of transport.

Operating tables, chairs, and office tables, except one of each, are unnecessary.

5. The transport must be entirely mule carriage. Camels are out of the question. All packages and boxes are limited to eighty pounds weight, and could therefore be carried on mules.

The following table gives a rough estimate of the transport required:

TABLE V.

	British Hospital.	*Native Hospital.*
1. Number of mules to carry the surgical equipment, as suggested above (roughly).....	36	30
2. Tent mules (roughly) at reduced scale recommended..	10—15	8—12
3. Drivers' and followers' kits.....	6	4

With such a hospital as has been roughly outlined above, it would be reasonable to expect that a cavalry force would be fairly equipped from the medical point of view. No doubt with every improvement that experience can suggest, men will still have to bleed to death unattended in the next big campaign, more especially in advanced squadrons, on patrols, etc.; but when the number of such victims *can* be reduced by a system of rational, relatively cheap, and certainly more efficient method of transport than at present exists, it would seem to be only fair to the service and to the individual that steps should be taken to bring about that end.—*Surgeon-Captain Bruce Seton, First Central India Horse, in Journal of the United Service Institution of India.*

A PORTABLE RAMP.

The illustration below shows a portable ramp, recently built for the Essex Troop of Newark, N. J., by the Pennsylvania railroad, at a cost of less than $25.00, and intended to facilitate the loading and unloading of horses when traveling by rail.

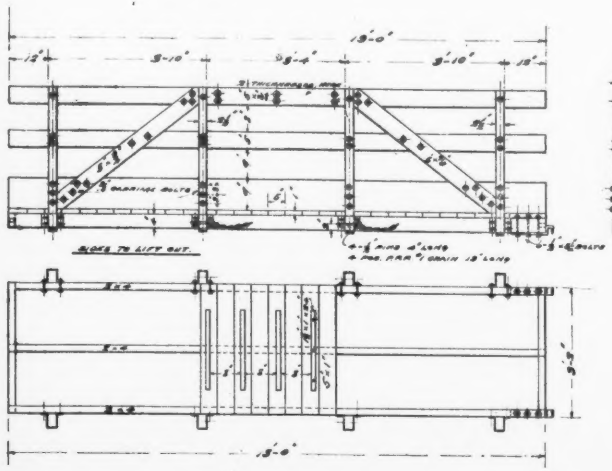
The troop had an uncomfortable experience at Trenton, N. J., at the time of dedicating the battle monument in 1894, the men and horses being forced to stand around in the mud and darkness for nearly two hours waiting for their train to back up to the freight platform. There was little consolation in seeing the Philadelphia City Troop go to their train in the yard, get out their private ramp, load up and start for home at their convenience.

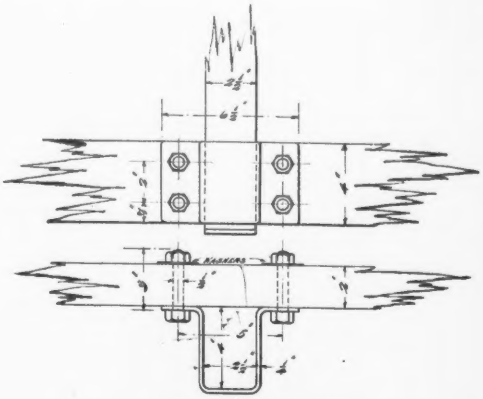
An attempt has been made to improve on a similar contrivance described in the JOURNAL some time ago, and which seemed unnecessarily cumbersome for the purpose both in weight and size, both of which have been greatly reduced without impairing strength, and, it is thought, with added safety for the horses and convenience to the men.

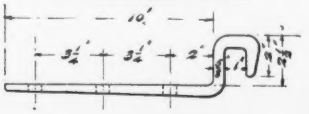
The floor is a framework, 13x3 feet, of beams of spruce, 2x4 inches, connected by cross pieces at the ends, and firmly bolted and mortised together, supporting crosswise planking of one-inch pine, to which are fastened suitable cleats or slats to prevent slipping. Four strong wrought iron stake pockets are bolted along each side of the

PROPOSED PORTABLE GANGWAY.
FOR
ESSEX TROOP.

JERSEY CITY MAR. 19. 96







APPROX. WEIGHT 460 lbs

frame, to hold the side braces. At one end, intended as the upper end in operation, are two powerful hooks which engage the lower guard rail of a car door and hold the structure in place.

The weight of this floor, including all attachments, is about 320 pounds. It can be handled by six or eight men with ease.

Each side rail is also a queen truss, and while weighing only 120 pounds, constitutes a substantial barrier to restrain a nervous, excited horse, as well as a powerful support to the flooring when it is under strain. The sides lift out of the stake sockets and can be easily carried by two men. The horizontal members, of pine, are one nine-inch board, to rest on the floor when in place, and above this two one-half inch boards, five inches wide, as a railing; the verticals are oak stakes, fitting closely into the sockets but not so as to jam.

The reason for trussing the sides is clear when it is noted that each of the two center stake sockets, and also corresponding uprights fitting in them, is bored for a half-inch iron pin to run horizontally through the socket and upright. The sides are thus secured in place, and are brought into play as trusses as soon as the weight on the floor is enough to bring a strain upon the pins.

The result is a substantial truss bridge of ample power to carry with ease all the weight likely to be put upon it. When taken apart, there are three sections, each about 13x3 feet, which will easily go into the baggage compartment of an ordinary combination car, at a total weight of 570 pounds.

Care has been used in working out details. The lowest side planks are made wide, and give the horse no chance to put his foot in any hole. The narrowness of the ramp insures against turning around; the sides are high and strong enough to guard against balking or backing off. It has been found that the cleats should have been run entirely across from side to side, as there was some slipping because they were too short. A set of folding handles would be convenient for carrying the floor.

The inclination is slightly less than one on three, under ordinary circumstances. Every extra inch of length adds weight and clumsiness, while decreasing strength. A two-inch plank on the ground for the lower end to rest on when in use, would guard against settling into the earth and decrease the steepness sensibly.

This ramp was used for the first time in loading up at Washington, D. C., March 5th last, and it was found very strong and perfectly satisfactory except in one or two minor details. Many officers regard a contrivance of this kind as unnecessary, but it serves a purpose and would have been worth thrice its cost to fifty wet, hungry and tired men, not to speak of the horses, on the Trenton trip above mentioned; for instead of waiting for the railroad company to back their train up to a platform the troop could have marched to the train and have been loaded at once.

While the general plan is my own, it is proper to state that the

details were worked out, strains calculated and working plan drawn under the supervision of M. J. W. BAUGHER, Department of Motive Power, Pennsylvania Railroad Company, Jersey City.

CHARLES WOLCOTT PARKER,
First Troop, New Jersey (Essex Troop).

SOME CHANGES THAT MIGHT BENEFIT THE SERVICE.

It is more than probable that the majority of the officers in our army have the good of the service at heart, and always welcome a change that improves its condition in any way, while on the other hand it is a matter of regret to them when anything occurs that causes a backward step.

Our army as it stands to-day is small compared to the country to which it belongs. It stands, however, as a model for the National Guard, and consequently should be kept in the best condition possible, both as regards its personnel and its equipments. Because it is small, this can all the more readily be done with the proper management and legislation.

The following changes, in my opinion, would all be steps toward the improvement of the service:

First. Do away with the consolidated messes, and turn the buildings into gymnasiums.

Second. Change the leather of the horse equipments, and give the enlisted men an aluminum mess kit.

Third. Make all drills and duty such as to hold a man's interest to the greatest extent.

Fourth. Give the enlisted man a slicker, a different headdress and overcoat.

Fifth. Change the color of the uniform.

1st. *Consolidated Messes.*—It seems to me to be generally acknowledged that consolidated messes for troops at a post are not a success. No matter how efficient the officer in charge of the mess may be, or how much he may try to please the men, there has always been, to my observation and from what I have heard of the messes at other posts, more or less dissatisfaction. With the individual mess, each organization has its own commander to look after it, and in place of having one officer for the general mess, there are as many officers as there are organizations to look after the men's food. This larger number naturally gives the mess more attention, and, consequently, it gives more satisfaction. The food is served to the men more quickly, and they are always able to have it warm, which is not the case in the consolidated messes. Bad food is one of the causes that leads to desertion. There is no better way to make a man contented than by giving him good food. The ration as it stands to-day, taken in connection with the exchange dividends, if properly handled by organization commanders, should give per-

fect satisfaction. The ration, however, should be made complete and ample in itself, and not made to depend on the exchange dividends.

The buildings now used for general messes at this post (Fort Riley), Fort Sheridan, Jefferson Barracks, Fort Leavenworth, and at such posts as have them, could be turned into gymnasiums, a much needed thing at all permanent posts. It is of the utmost importance that everything possible be done to awake and hold the interest of the enlisted man in his profession. Make the army a thing to be desired by the soldier, a place where he is contented, and it will not only improve its character but also increase its patrotism, and give it a higher physical and intellectual development. Of course the commander of each independent organization can do much towards this end by the proper and judicious handling of his men; but aside from this, a gymnasium with swimming tank and bowling alley at each of the large permanent posts, would be of the greatest benefit.

The average man is fond of athletics, and had he an attractive place to go for exercise when not on duty, and where he could meet and compete with men of other organizations, he would spend much of his time there. He would be a better man for it, both mentally and physically, and the service would also gain by having fewer court-martial cases, and fewer desertions. By far the greater number of military offenses committed by enlisted men, are due to liquor. The men, when not on duty, want a place to go or loaf. They become tired of their quarters, being there more or less all of the time, and the post exchange affords them a place for but little recreation, consequently they wander aimlessly about and, too frequently, get into trouble.

A gymnasium, such as I have suggested, would probably stop much of this. It should be kept open every evening, and I venture to say that a large part of the command would always be found there. The buildings now used for general messes could be easily turned into gymnasiums, and other buildings built for separate organization messes. The matter of expense may be urged against this, but the benefit to the service would more than repay for the amount expended in making the change. Furthermore the buildings could also be used for drill halls. During this spring at Fort Riley, on a large number of days it has been impossible to drill outside. There is no room in the troop barracks where any kind of a drill can be carried on satisfactorily for want of space, and although some drill has always been attempted, much benefit and progress has been lost by not having a suitable place.

Now that athletics and physical training are beginning to have their proper attention in the army, a suitable gymnasium at each permanent post will be more necessary than ever, and should be established.

2d. *Leather Equipments, etc.*—As has been advocated many times by cavalry officers, the leather part of the horse equipments should be of fair leather, like that used in the California saddles.

This would enable the trooper to keep his equipments cleaned and in much better condition with far less time and trouble, and officers' and men's clothes would not be soiled and almost ruined from the black leather, as now often happens. This is especially true of the white gauntlets which, with the black leather, are often soiled and blackened the first time they are used. The leather of the California saddles is called upon to stand the severest tests of both weather and usage, and stands these tests in a manner which proves how serviceable it would be.

If the tin cup, meat-can, canteen and fork and spoon were made of aluminum, it would be an improvement for two reasons: 1st, They would be lighter than the present ones. 2d, They would be more easily kept clean, would be always bright, and would not rust. The field mess kit now furnished the trooper does not wear well. After using them on the target range in camp last summer for about six weeks, those of Troop "K," First Cavalry, and probably those of the other troops also, were in pretty bad condition. The tin was entirely worn off in many places. The inspector remarked on their condition when here, and seemed to think they were not fit for much more service of any kind. Were they made of aluminum this tin wearing off would be avoided.

If fifteen per cent. nickel steel will not rust, and will answer the purpose, saber scabbards, bits and curb chains should be made of it and furnished the cavalry. The advantage of having these articles in a material that will not rust is worth the expense of making the trial.

3d. *Drills and Duty.* The greatest care should be exercised in ordering drills and duty, in order that the best results may be obtained. A drill or duty should be for one of two objects, namely, for instruction, or for the actual needs of the service. When it is not for either of these purposes, it becomes a drudgery and is useless, and time so spent can be much more profitably used in other ways.

In time of peace, officer of the guard duty, except for a certain period during each year for instruction, is rather detrimental to the service than otherwise. This is particularly the case where there are only one or two officers with a troop. It often happens that both officers may be taken from the same troop for guard, and another officer detailed to take command of it. The latter knows nothing of the methods or progress of that troop, and that day's drill is practically lost. At a post where an officer goes on guard once a week, there are two mornings out of each seven on which he is taken from his drills and other duties, and one of these mornings is spent in the guard house practically doing nothing.

Drills should always be such as to hold a man's interest to the greatest extent, and not made too long, as is sometimes done. The drill regulations contemplate this. Paragraph 22 says: "Short and frequent drills are preferable to long ones, which exhaust the attention of both instructor and recruit." Small arms firing regulations,

paragraph 24, says: "It is essential that the attention of the soldier be obtained and held." A man who goes to drill and puts his attention on what he is doing, and thinks what each command means, will learn more in one day than another who pays no attention, but gets through as best he may, will in a week. With the present drill of an hour in first aid to the injured it is impossible to retain the attention of the men for all of that time. Men should not be made to do too much, as faulty work is the only result. There is an old saying, that "it will keep a man out of mischief to keep him busy." This is partly true, but there is such a thing as keeping him too busy, and giving him so much to do that he slights everything. Paragraph 170, A. R., requires most special duty men to attend all drills and inspections. This should not be, as sometimes it is impossible for a man to attend all drills and perform his special duty properly. The waiters in the general mess at this post, and probably at all posts where there are general messes, should have nothing to do but to attend to their duties in the mess hall. They are up before reveille in the morning, and they do not finish their work until after supper; and there is sufficient work for them each day in the mess hall, keeping everything clean and in order as it should be.

In reference to signaling, the change back to the old Myer code was a bad one. Messages cannot be sent as quickly with it on the heliograph as with the Morse code; and now in order to be able to telegraph and to signal with the flag, torch, or heliograph, it is necessary to know two codes. If the same code was to have been used by both the army and navy, it should have been the Morse code, as long as the Morse code was to be retained on the telegraph. The continual changing from one code to another has a bad effect upon the service. Officers and men who have perfected themselves, often with much trouble, in one, and who took a pride in so doing, become discouraged when they find their work has been for nothing and that they must start all over again.

4th. *Uniform.*—The dress helmet is uncomfortable, hot and heavy, frequently causing headache, and a more suitable head-dress should be furnished. The overcoat of the enlisted man might be greatly improved. The present one affords little protection from either rain or cold. Slickers should be furnished each soldier by the Quartermaster's Department. They are one of the most useful articles of clothing that an enlisted man can have, and would add more to his comfort in wet weather than anything else. At present on rainy days enlisted men around a post may be seen in the greatest variety of protecting garments. Some appear well, some appear slouchy, but there is no uniformity in any of them. A full black rubber slicker, should be included in the soldier's clothing allowance.

5th. *Color of the Uniform.*—A suitable color in grey would be better than the present blue. It is harder to see, and would afford more protection to men in action. A uniform of this color would look better in the garrison after slight wear, than the present blue, and in the field and campaign it would have a much better appear-

ance. It would be hard to find a color that will show dust and grease more than the blue. Appearance in itself is a reason why the color should be changed, but by far the more important reason is that the grey is less visible than blue. It has been distinctly noticed at the fall maneuvers at Fort Riley, how much more distinctly the Blues could be seen than the Browns, both mounted and dismounted. With a dismounted skirmish line of the Browns, it was often hard to tell which was man and which was grass; but generally with the Blues, each man presented a plain and distinct target for the opposing forces to aim at.

With the grey color a man would be almost as invisible as with the brown. A writer, in an article published in *Harper's Weekly* last year, said, "that one day in approaching West Point, he was unable to distinguish a mounted column of cadets until close to them on account of the color of the clothing, whereas had they on the dark uniform, they would have been plainly seen some distance off." With troops on patrol duty, scouting, or as videttes or Cossack posts, or on any duty requiring secrecy, where men are cautioned to see without being seen, the less visible the color of the uniform the more efficiently they can perform their duties, and with the less risk of being discovered. From experiments made in France, grey was shown to be less visible than blue under ordinary circumstances. Other things being equal with two opposing forces in battle, the more prominent color of a uniform worn by one side or the other would give a big advantage at once to the opponents of the side wearing it. It would increase the number killed and wounded on the side to which it belonged, and might easily give their enemies the victory. Certainly this reason is more than sufficient for making the change to the grey color.

S. B. ARNOLD,
Lieutenant, First Cavalry.

SOME SUGGESTED ARMY CHANGES.

Last year the Major-General commanding the army addressed a circular letter to officers of the army, requesting an expression of their views on many matters of great interest and importance to the military service. I will take his questions numbered 3 and 11 as my texts for this paper.

Question No. 3 is: "What suggestion have you to make, if any, concerning the uniform, its requirements and suitability for garrison and field service, fatigue duty, and occasions of ceremony?"

Until a comparatively recent period a text book was used at West Point which said: "The soldier going into battle should put on his full dress uniform. It is an honor due to a brave foe." Nowadays the enemy is treated with less consideration.

In my opinion the full dress uniform should not be worn in battle; neither should it be worn on any other occasion. It should be relegated to the closet of the costumer, and worn only to recall the memories of by-gone times, when BRADLEY-MARTINS of the future

give fancy dress balls. The full dress uniform is not comfortable. The coat is too warm for social occasions, and the helmet is uncomfortable for all occasions. It is an expensive and unnecessary uniform, and for it I would substitute the present undress uniform, without any addition for officers or men dismounted, or any modification except that the present cap should accompany the helmet into retirement, and something like the present campaign hat, but of better material and finish, be substituted for it, for use on all occasions. The use of straw hats, fur caps, fur gloves, etc., to be authorized for certain climates. Both blouses and trousers should be made in two grades, for summer and winter; and in summer the blue flannel shirt, even in garrison, should be authorized, without any blouse.

I am not in favor of a reinforce for the seats of mounted men's trousers. It makes the trousers heavy and uncomfortable, and the cavalryman who rides with a close, firm seat, is more apt to wear out his trousers at the knees than at the seat. When the reinforce does wear out, it is usually patched instead of being cut away, making three thicknesses of cloth and great bunchiness. Then, too, the reinforce adds to the expense.

I would substitute a water-proof, leather-palmed glove for the present gauntlet and abolish the white glove for enlisted men, except for orderlies and on occasions of ceremony. I believe white gloves are not worn on guard or on drill by European soldiers, and they impede the proper handling of small arms when there is any work to be done.

I am in favor of doing away with the boot by both officers and men, and using only the legging on all occasions now calling for boots. I agree with Captain KENDALL, Eighth Cavalry, who says: "The foot gear of all troops should consist of a laced ankle shoe, perfect in material and workmanship, made in a sufficient number of widths and sizes to fit any foot that would be accepted in the recruit."

I would issue, to mounted troops at least, a light rubber coat or slicker, and oil skin overalls, to use when in the saddle in rainy weather in summer, and would substitute a blanket-lined blue waterproof cloth overcoat for cold or rainy weather. Such a coat might not look quite so neat as the present soldier's blue overcoat, but it would be far more comfortable and sensible, in my opinion.

I would make no change in the brown overalls, which should be worn on fatigue and sometime in the field, as at present, and might be worn also at stables by the cavalry in place of the white overalls, thus further reducing the clothing allowance.

In regard to the underclothing I have no suggestions to offer, as I have worn it myself and found it comfortable.

It is believed that the uniform enumerated above, if made of good material, by honest workmen, is durable, economical, neat and inconspicuous, and that, for the purpose of an American army, no better one can be suggested. I would have the officers' uniforms

differ only from the men's, in so far as their individual pocket-books permitted them to indulge in better quality and fit; the distinctive shoulder-straps, chevrons, stripes and other marks of rank, to remain as at present. I would abolish the sword or saber knot as a useless, expensive and superfluous appendage.

Question number 11, in the letter from the Major-General commanding the army, calls for suggestions regarding the camp equipage, tentage and field equipment.

The present method of supplying tentage to the army is unsatisfactory to the line. When a command is ordered into the field, tents are issued by the Quartermaster's Department and are supposed to be in good serviceable condition, but, alas! the first day's camp develops the fact that many of them are full of holes, and some are practically worthless. A return to the old system of issuing tents is recommended, when each organization cared for its own canvas and every captain knew about the condition of each tent that was carried on his papers.

Now, in regard to the kind of tent most desirable in the service, and especially in the cavalry. The weight of canvas is, indeed, a serious drawback to its use and, yet, tents in this country are peculiarly necessary, owing to the severity and uncertainty of our climate in most parts of the United States, and the fact that billeting the troops in the houses of the inhabitants of the country, as is done in Europe, is impracticable with us. The simplest way to reconcile the necessity for tents with the serious drawback of their weight, seems to me to be the adoption of the shelter tent more generally than at present, other tentage to be used only in permanent camps. The prejudice which appears to have existed against the use of the shelter tent heretofore in our service, was largely owing to the fact that its name was a misnomer, for, owing to the poor material of the alleged canvas, the old shelter tent really afforded no shelter. Its meshes might exclude mosquitos, but water went right through it. But the new shelter tent is an improvement. It is *usually* water-proof and is accompanied with the necessary poles, pins and fastenings. The pole is hardly strong enough, but can be readily strengthened by the handy trooper.

I am in favor of brown canvas for tents, and for the shelter tent would use a heavier canvas than the present one is made of, or else paint the present canvas with some water-proof preparation. The fact that the complete shelter tent has to be divided between two troopers is a drawback, since necessity often arises for detaching a man from his troop and even from his squad. I would let half the troop carry the complete tent, dividing the burden, if necessary, on alternate days.

In a recent number of the CAVALRY JOURNAL an officer, while advocating the use of the shelter tent for men, says that officers should use them also on all occasions. To quote his words: "Officers should not luxuriate in tents and bedding and mess outfit, while their soldiers are treated with scant consideration."

If sleeping in shelter tents implies being treated with "scant consideration," then I am in favor of letting an officer "luxuriate" in a somewhat larger tent when the necessities of the service permit. An officer has a larger baggage allowance than a soldier, and this implies a larger allowance of shelter for the same. He is also, as a rule, older in years than the enlisted man, and expects to remain in the service longer, and therefore the government is the gainer by the care he takes of his health. Moreover, he often has important public records to protect from the weather, as well as his books and public funds. Therefore an officer might be permitted to "luxuriate" in at least an A tent, while his men are under shelter tents.

Apropos of tents, it may not be amiss to remark, that although uniformity is desirable in pitching and striking tents, the subject does not seem to be touched upon in any of our authorized drill books, except in the hospital manual.

I would advise substituting a simple form of tent drill for some of the superfluous matter in the cavalry drill regulations. "The Employment of Cavalry," for instance, might be omitted, as it is contradictory to much of the text in WAGNER'S "Security and Information."

Until this or something similar is done, every separate command will follow the ideas of its own commanding officer on the subject of tents, and different methods of pitching and striking tents, and even of driving tent pins, must continue to prevail.

J. A. LOCKWOOD,
Lieutenant, Fourth Cavalry.

CAVALRY PITCHING AND STRIKING CAMP.

The squadron being in column of troops at full distance (each troop having one yard additional distance for each trooper temporarily absent) the troops are dressed to the right on the guidon and dismounted.

The guidon of each troop is planted midway between the two ranks of the troop, and marks the right of the picket line.

The line is then stretched from the guidon to the left between the two ranks, and the horses tied on it about one yard apart. If the picket line is not at hand, the place selected for the same is marked on the ground.

The guidon is then planted between the picket line and the picket line of the troop next in rear, so as to mark the front of the right of the line of tents. A saber is likewise placed towards the left flank to mark a second point on the line of the front of the tents.

WITH SHELTER TENT.

To Pitch Camp.

The squadron commander commands: 1. *With shelter tents*, 2. PITCH CAMP.

This command is repeated by troop commanders. Each trooper then secures a shelter tent half, five pins, and an upright pole.

The troopers fall in, squads in their proper places, on the guidon, facing the picket line, in two ranks, with intervals of about three yards, and a distance of about three yards between ranks. The first sergeant falls in on the right of the troop, and the non-commissioned officers in charge of squads on the right of their squads.

The guidon marks the right of the front rank. The right trooper of the second rank is three yards in rear of right trooper of the first rank.

The troop commander then aligns the two ranks, after which each trooper places his shelter tent half and tent pins on the ground immediately in his front, the second rank also placing their poles upon the ground, each trooper of the first rank holding his upright pole (disjointed), one-half in each hand.

The troop commander commands: 1. *Prove*, 2. DISTANCE.

The troopers raise their arms laterally until horizontal, the poles being in the extension of the arms. The troopers on the right and left of the rank do not raise the arm nearest the out flank. When the ends of the poles touch, the troopers have their intervals. The alignment is verified, and each trooper of the first rank sticks a pin between his feet, on a line with his toes. The lines of the tent pins are then dressed. Each pin indicates the position of the front upright of a tent, which is placed against and in rear of the pin.

In pitching the tents each trooper of the first rank is assisted by the trooper of the second rank directly in his rear.

The tents when pitched are aligned by the first sergeant, if necessary.

Tent intervals should be about two feet. Three yards between poles.

To Strike Tents.

When the general is sounded each man hastens to the position he had when pitching tents, takes up the pins and at the last note the tents are laid down to the right. The men then proceed to their saddles and pack them.

WITH CONICAL WALL TENT.

To Pitch Camp.

The squadron commander commands: 1. *With conical wall tents*, 2. PITCH CAMP.

This command is repeated by troop commanders.

One non-commissioned officer and four men pitch each tent, each squad furnishing the detail for its own tent.

The non-commissioned officers in charge of details cause them to count fours. Nos. 1 and 2 of each detail procure canvas, No. 3, tripod and pole, and No. 4, the tent pins and two mauls or axes. They

all unroll the tent and spread it out near where it is to be pitched, apex at the center.

The non-commissioned officer in charge of the detail for the first tent steps off four yards from the guidon on the left along the line established, and causes No. 1 to drive two pins two feet apart to mark the door of the tent, the first pin being about four yards from the guidon.

The second non-commissioned officer steps off ten yards from the left door pin of the first tent and causes the foot-pins of the doorway of his tent to be established in the same manner as those of the first tent. Each non-commissioned officer in succession thus establishes the pins of his doorway, on the line prescribed, the intervals between doors being about ten yards.

Each non-commissioned officer measures with the tent pole from the middle point between the door pins directly backwards, the far end of the spindle of the pole determining the center of the tent, which he causes No. 1 to mark with a pin. No. 4 places three pins near the center pin. No. 2 places the tripod opened out flat, center over the center pin. The men now take post,—No. 2 in front, No. 3 in rear, No. 1 on the right, and No. 4 on the left of the tent. They work near these positions in pitching and striking tents.

All then bring the canvas over the tripod till its center comes to the center pin, and door at the front pins, when No. 2 slips the foot stops at each side of the door over front pins, and places the door of the tent opposite the pins.

Nos. 1 and 4, commencing at the front and rear of tent respectively and working on the right and left sides of the tent, scatter the pins and pull out the eve lines. Nos. 2 and 3 each take a maul or axe, and commencing front and rear respectively, work on the right and left sides of the tent, driving the eave line pins, placing them about one yard from the edge of the tent, in line with the seams.

The point for driving the eave line pins may be found more accurately in the following manner: Measure and mark upon the hood lines from the hood in the direction of the free ends of the lines the distance eleven feet three inches—the radius of the circle of eave line pins. Measure from the points thus determined towards the free ends two feet eleven inches—the interval between eave line pins, and mark the same. By applying this measure, the distance of the eave line pins from the center and their proper intervals may be determined.

As the pins are driven, Nos. 1 and 4 place the loops of the eave lines over them, respectively working on the right and left sides of the tent.

When the pins are set Nos. 2 and 4 creep under the canvas, slightly raise the tent and place the spindle of the pole through the plate, and raising the pole, set it in the socket of the tripod. No. 3 having, from the outside, placed the hood over the spindle, enters the tent by creeping under.

The non-commissioned officer places a maul or axe under the tent, and standing near the door, causes the men within to raise the tent so that the door is kept directly opposite and above the door pins. No. 4 now leaves the tent. The non-commissioned officer enters and inspects and adjusts, when necessary, the tripod and pole, and causes a pin to be driven against each leg of the tripod. Nos. 1 and 4 tighten the eave lines; they then scatter the wall pins. Nos. 2 and 3 drive the wall pins, working as before, No. 2 toward the right rear, and No. 3 toward the left front. Nos. 1 and 4 fasten the hood lines.

In pitching, as soon as any man has completed his assigned work he assists others until all have finished.

The interval between the centers of tents should be about thirty-four feet—the front of seventeen men in rank.

To Strike Tents.

The general is sounded, or the major commands: 1. *Strike*, 2. TENTS.

The same detail is required as for pitching tents. All articles are removed from the tent and the door cords tied. The wall pins are first removed, and then all the eave line pins, except the quadrant pins.

No. 2 now enters the tent, removes the pins at the feet of the tripod, and remains in the tent until after it is lowered. The non-commissioned officer takes his post near the door. The loops of the quadrant lines are now removed from the pins, and the lines held until the last note of the general, or until the command "*Tents*," when the tents are lowered to the indicated side. The canvas is then rolled up and tied by Nos. 1 and 2, while Nos. 3 and 4 fasten the tripod and pole together, and collect the pins.

Tents may be pitched and lowered, according to the principles prescribed, by details consisting of more than five men.

THE WALL TENT.

To Pitch Tent.

Four men are required to pitch a wall tent, and will be numbered from 1 to 4.

Nos. 1 and 2 will place the right pole so that the ends will rest where the front and rear uprights are to be, and pins will be driven at these points by Nos. 3 and 4. Nos. 1 and 2 then place one end of the ridge pole at the front pin, and the other end to the right of, and perpendicular to, the line of the front and rear pins. From the outer end of the ridge pole No. 2 takes one pace to the front, at which point a large pin will be driven. The ridge pole will then be laid to the left of the front pin; one pace to the front will be taken by No. 2 from the outer end, and another large pin will be driven at that point.

Measurements will be made in the same way from the rear pin, except that the paces will be taken to the rear, the rear corner eave line pins being thus established.

The four corner eave lines are then attached to the pins, the ridge pole is placed in position, the spindles of the uprights inserted in the ridge pole, and the tent and fly adjusted on it. The tent is raised by Nos. 1 and 2 at the front upright, and by Nos. 3 and 4 at the rear upright pole. The tent is held in position by Nos. 1 and 3. Nos. 2 and 4 tighten up the eave lines. The other pins are then driven by all four men. The eave line pins are placed in line with the front and rear corner pins, and in the prolongation of the seams of the roof.

To Strike Tent.

Before or when the general sounds, all the pins except the four corner eave line pins are taken up. No. 1 goes to the front upright pole, No. 2 to the rear upright pole, No. 3 to the front and No. 4 to the rear corner pegs on the side opposite to that toward which the tent is to fall. At the last note of the general the tent is laid on the ground.

THE COMMON TENT WITH WALL.

The common tent with wall is pitched in a manner similar to the pitching of the wall tent, except that an upright pole is used instead of the ridge pole in determining the position of the eave line pins, and a short pace (about twenty inches) is taken to the front.

The striking of this tent is the same as that of the wall tent.

When the officers' tents are to be upon the left flank, all alignments are made to the left.

The squadron may also camp in line, in which case the camp is formed on the same general principles.

When camp is established with shelter tents, and there is not room in line or column, the shelter tents may be pitched in two parallel lines. In this case the front of the second line of tents will be established about three yards in rear of the tents of the first line. The intervals between the tents in the two lines should be directly opposite, and each tent of the second line should be directly in rear of the corresponding tent of the first line.

The requirements of Pars. 989–994, cavalry drill regulations, will govern in the establishment of squadron and regimental camps.

The foregoing system of pitching and striking camp was prepared by a board of officers at Fort Leavenworth, Kansas. In its preparation the board consulted many officers of experience. Nearly every regiment in the service was asked for its opinion, and many practical experiments were made.

THE GRÆCO-TURKISH WAR, 1897.

The best information obtainable in England as to the composition and numbers of the Turkish and Greek armies is to be found in the official hand-books compiled in the Intelligence Division of the War Office. That relating to Turkey is dated 1892, but is applicable to the present day, and the hand-book to the Greek army is dated 1895. The accompanying map has been specially compiled from the latest sources.

The Turkish military forces are organized on the territorial system, and for this purpose the Empire is divided into six districts, known as "ordu," with a special seventh ordu in Yemen and Hejaz. The headquarters of these six districts are at Constantinople, Adrianople, Monastir, Erzinjan, Damascus and Baghdad. All Mussulmans are liable to military service, but Christians and certain sects pay an exemption tax. The liability commences at twenty years of age, and lasts for twenty years, made up of four years with the colors, and two in the reserve of the Nizam or regular army, eight years in the Redif (corresponding to landwehr), and six years in the Mustahfuz, or militia. The Nizam or regular battalions number 284, the establishment of each battalion being nearly 1,000 of all ranks. The Nizam or regular cavalry consists of thirty-eight regiments of the line, two regiments of the line, two regiments of the guard, and two squadrons of mounted infantry; the war strength of the regiments being about 900 men and horses, and their armament consisting of carbine or rifle, sword and revolver. The guard regiments are armed, in addition, with a lance. The artillery consists of fifteen horse artillery batteries, 169 field batteries, forty-two mountain batteries, and sixty-four companies of fortress artillery, the total guns in the horse, field and mountain batteries amounting to 1,356. The engineers consist of thirty-one engineer companies, four telegraph companies, and four torpedo companies. A Nizam, or regular infantry, division on a war footing consists of sixteen battalions of infantry, one of rifles, and thirty-six guns; a cavalry division consists of six regiments, or twenty-four squadrons, and a horse artillery battery of eighteen guns; while an army corps consists of two infantry divisions, a cavalry division, and other troops. It is difficult to say if the Redif, or landwehr, would be organized into army corps. The whole military force of the Empire amounts to 700,620 men, of which 54,720 are artillery (with 1,356 guns), 7,400 engineers, 55,300 cavalry (in 202 squadrons), and 583,200 infantry, including 255,600 regulars, 316,800 Redhif, or landwehr, and 10,800 militia.

The German officers who have assisted in the reorganization of the Turkish army since 1880—KOEHLER and KAMPHOEVENER, VON HOBE, RISTOW, SCHILGEN and VON DER GOLTZ—know how fine is the fighting material of the Sultan's soldiers. Writing to the *Militär-Wochenblatt*, of 28th April, VON DER GOLTZ gives some of the impressions which he has formed of the army: "A superficial observer," he says, "cannot arrive at any correct opinion on the subject. The well-clothed battalions and well-mounted squadrons to be seen sur-

rounding the Sultan, are totally different from the provincial troops, especially if they belong to a badly-governed province. There has never been any systematic and uniform instruction of the soldiers by their officers, but the latter are not to blame for the often miserable appearance of the men. That is due to the meager and irregular issue of their pay by the provincial authorities. Yet the worst paid and worst fed troops of the Turkish army are more to be trusted than the smart guards of Yildiz, who seem to have caught the spirit of intrigue which pervades the palace, and over whom the influence of their officers is of the smallest. The loyalty, however, of the Turkish soldier, as a rule, is undoubted, and his power of endurance is extraordinary. The amount of physical labor he can perform in circumstances of extreme discomfort and privation, without uttering a murmur, has again and again called forth the admiration of war correspondents; and the fact that his officers have perfect confidence in his courage and steadiness, is the best proof of his value as a fighting man." This opinion of VON DER GOLTZ will be endorsed by many who have had any experience of Turkish troops. No one who was present with their armies during the campaign in 1877 can ever lose the impression there formed, that the Turkish soldier—Nizam, Redif or Mustahfuz—is a fighting man of the first order. Captain LEBRAN RENAUD, of the French army, who has made the military power of Turkey a study, says of it to-day: "Every day the Ottoman army is making serious progress; it is recruited with regularity; it is well armed; its maneuvers are based upon correct rules; new railways enable its rapid mobilization; it is in a condition to meet eventualities from without."

The organization of the Greek army is based on universal conscription. The liability to serve begins at twenty-two and lasts for thirty years. In the cavalry two years are supposed to be spent in the active army and eight in its reserve, and ten years in the territorial army and ten in its reserve. Similarly in the infantry, two years are supposed to be spent in the active army and ten in its reserve, eight years in the territorial army and ten in its reserve; but these terms are not kept to. The artillery consists of eleven field batteries and nine mountain batteries, or 120 guns. The officers and men in the artillery seem to be more intelligent than the rest of the army, and are quick at picking up their drill. The engineers include two field battalions, one railway and telegraph company, and one pyrotechnic company. The cavalry consists of three regiments, or twelve squadrons, and they are armed with carbine and sword. The infantry consists of ten regiments of the line and six battalions of light infantry and rifles. The total war strength is 66,250 of all ranks, 180 guns, and 126 ammunition wagons. According to the official hand-book, the mobilization of the Greek army would take from eight to ten weeks, and would not then be satisfactory. By far the best soldiers are the Evzoni (*εὐζωνοι*), who correspond to our Highlanders. They wear the Albanian dress, which is generally regarded as the Greek national costume. They are a fine set of men, carry themselves well, have a springy stride and martial

bearing, and are the pick of the Greek troops. The ordinary Greek regiments of the line, judging from what is seen of them slouching about the country or loitering in the towns, in shabby and ill-fitting uniforms, could hardly have been expected to give a great account of themselves. But it is in discipline more than in anything else that the Greek soldier is lacking.

Compared with 1866, with 1870, and with 1877, the Græco-Turkish War is of small account. Yet it has, for the general reader as well as for the military student, an interest above its merits.

The general reader who has read of the power of the machine gun and the magazine rifle expects a carnage awful and unprecedented, and owns reluctantly to a sense of disappointed prophecy when he learns that the death rate so far is less than in previous wars. He has ignored the fact that the improvement in weapons tends to reduce, not to increase, the percentage of loss in contending armies. The military student is anxious to see how his pre-conceived notions of the destructive effect of the shrapnel fire of modern artillery, the use and abuse of cavalry, and the methods of a modern infantry attack, bear the test of practice after twenty years of theory. The events chronicled are so recent, that a detailed review of the course of the campaign in Thessaly would seem unnecessary, and a few notes on some of the various points of interest which have arisen will occupy fully the space allotted to this article.

The Turks lay to the north, the Greeks to the south, of the range of mountains which is pierced by the Maluna Pass—the Turks in superior numbers. There were troops of each force to the right of this pass, and troops of each force to the left; some of them miles away from the decisive point, which was the nearest road from capital to capital.

The struggle at the Maluna Pass, which began on the 17th April, involved (as did SULEIMAN'S attack on the Schipka in 1877) a direct assault on a mountain stronghold, and resulted in favor of the attacking Turks principally by the effect of their artillery fire, though, strange to say, the actual destruction caused by this fire is reported to have been very small. The battle was continued in the plain day by day till Turnavo fell, and the feature of these days' fighting would seem to have been the small proportionate loss of the men engaged, the long range at which the infantry fire was opened and continued, and the gradual assertion of the Turkish predominance in artillery.

By the evening of the 23d April the Turks had established themselves within striking distance of the Greek position, and a trivial cavalry movement of theirs in the dead of night caused that panic and flight of their enemy's troops which will render the name of Larissa famous for years to come. Worn out with the prolonged strain of several days' fighting, unfortified by the stimulus of an iron discipline, mixed with the unarmed civil population, and, worse than that, with the armed but undisciplined "Associations of Patriots," the Greek army broke and fled. The incident is valuable reading

for those who rely on enthusiasm to take the place of ingrained discipline, and improvised efforts the place of a complete training in time of peace.

The Greek army rallied creditably after its period of disorganization, and took up a faulty position, its left on Pharsala and its right on Velestino, its extreme right being at Volo. The latter place, it must be remembered, was that at which the troops were landed when sent from Athens, as the passage by water was easier than the passage over the mountainous region between the capital and the frontier. So that the retreat of the main force on Pharsala necessitated a widened gap between this part of the army and its base of supplies. Further, the result of this retreat on Pharsala was to give up the water route as a line of retreat, and compel the Greek force to rely on the mountain roads, with their scanty means of subsistence.

The railway which connects Volo with Pharsala and Trikhala, branches at Velestino to Larissa. Hence the importance of Velestino. The Turks, once established there, could use the railway as a means of supply for their troops, and they thereby could cut off the Greeks at Pharsala, or its neighborhood, from their sea base at Volo, and compel them to trust to a risky retreat by a mountainous and ill-supplied route. This all-important junction nearly fell at once into Turkish hands. A cavalry reconnaissance almost carried it by a *coup de main*, the advance of the cavalry from Tel-el-Kebir to Cairo was nearly repeated, and the venture probably failed for the want of a handful of quick-moving infantry. What would that cavalry leader have given for a battalion of our mounted infantry! The Greeks repulsed this cavalry attack, recognized the value of the place and strengthened it, and its capture cost the Turkish army dear.

The Greek commander, relying, probably, on the line of railway which connected his two wings, appears to have committed a common kriegsspiel error in extending his troops over a space of country too extensive for proper occupation. The result was that he was strong nowhere. On the 5th May the Turks attacked both extremities, penetrated in the center, and the loss of Pharsala brought about the loss of Velestino. During the night the Greeks fell back and took up a strong position at Domoki, about twelve miles to the south of Pharsala. A concentration of the whole force near Velestino might have delayed, if it could not have averted, the final collapse.

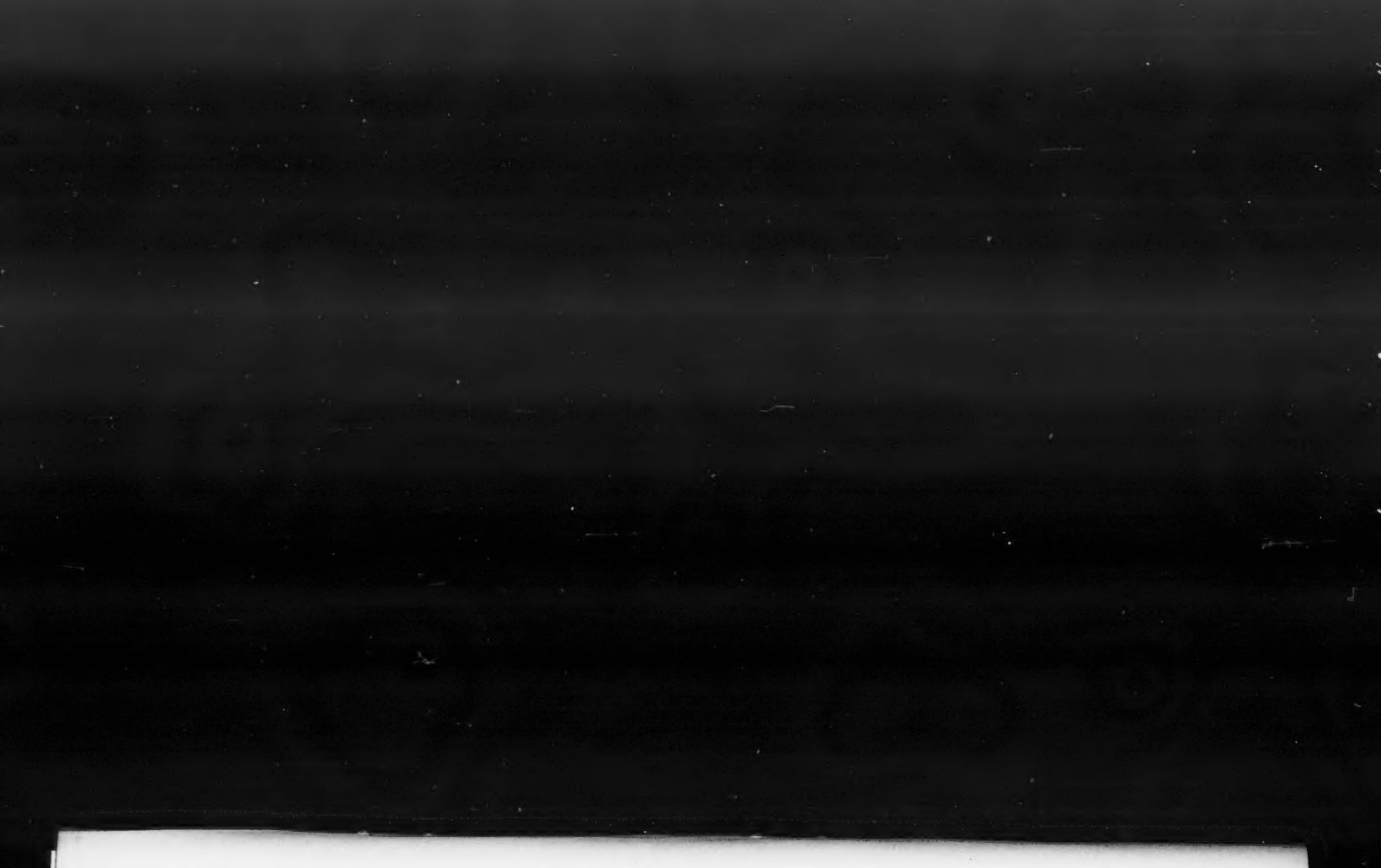
One incident in the attack on Velestino will redound to the credit of all concerned. A fresh battery of artillery was causing loss and annoyance to the advancing Turks. A body of Circassian cavalry, led by the son of an old Turkish warrior of Armenian fame, fired by the highest traditions of cavalry leadership, moved forward to the attack of the guns; the charge was ridden nearly home, when the infantry escort to the guns, admirably placed and concealed, opened a convergent and overwhelming fire, and the gallant Circassians fell back with a loss of men and horses, leaving the battery intact, but with the satisfaction of having maintained the highest traditions of the cavalry arm.

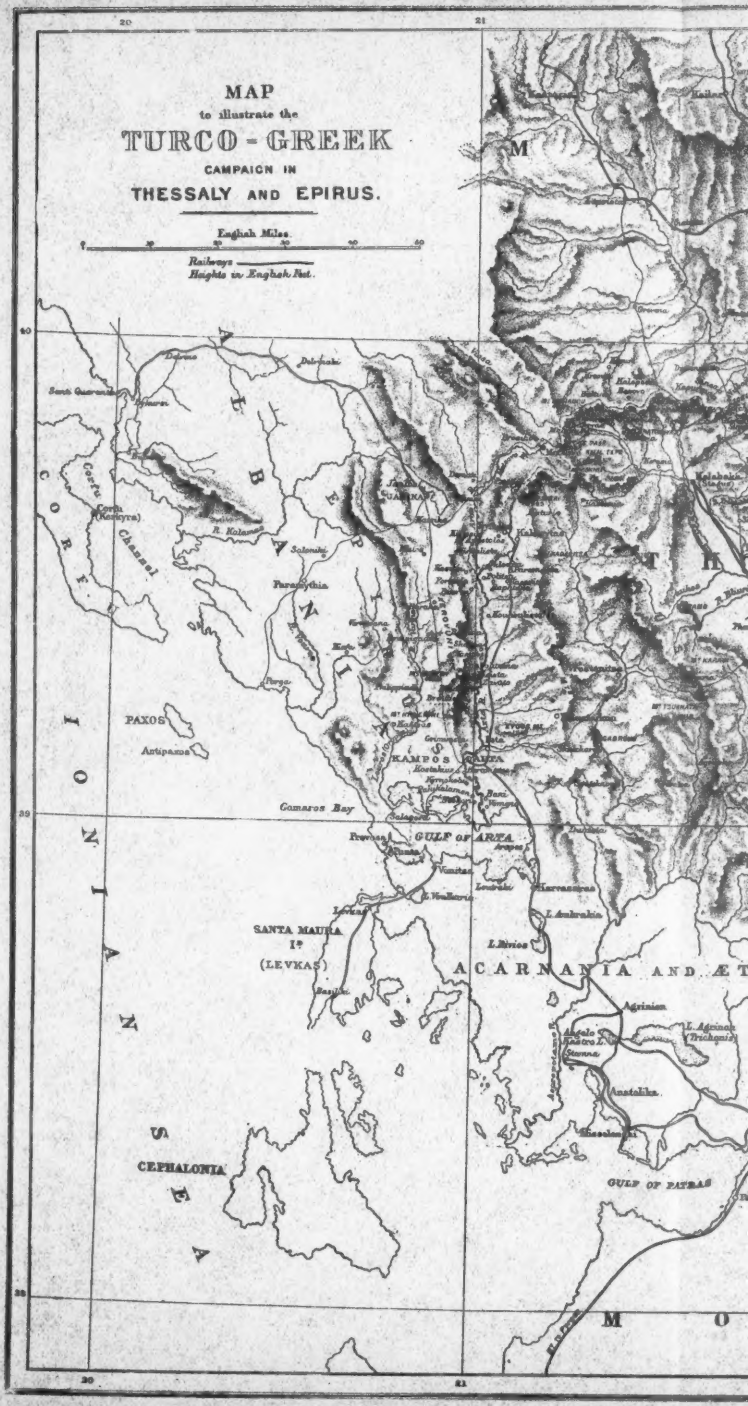
Those who have studied the Russo-Turkish War of 1877–78 were by no means astonished to hear on the morning of the 1st May that the hitherto successful EDHEM PASHA had been superseded. The changes in the commands, in the former war, and the constant interference in the military plans telegraphed from Constantinople had a most baneful effect on the fortunes of the Turkish army. And it looked as if a similar supersession of commanders was to be initiated in this case. Luckily the success of EDHEM before Larissa came in the nick of time, and the continuity of command was maintained. The Turks are not the only people who have complained from home of the slow movement of their armies in the field; but surely this time there was little enough cause for impatience.

Given their superiority in numbers, the Turks have had a difficult task; and the order and regularity of their advance, their application of "superior force at decisive points," their triumph over the difficulties of supply down a long and mountainous line of communications, deserve all praise.

No less is their moderation in success worthy of admiration—it was not always so in the Russo-Turkish War; but in this campaign their behavior has apparently rivaled the most "moderate" army of modern times—the Germans of 1870–71.

To the fighting value of the Turkish soldiers the following passage, written twenty years ago by an Englishman, a master of the art of war, who knew them well, bears ample testimony. It is as true to-day as then, and in it lies the main reason of the Turkish success—in the converse qualities the main reason of the suddenness of the Greek failure: "The trained Turkish soldier seemed to possess every military virtue. Patient and enduring, submissive to discipline, of strong physique, and a good marcher, cool and brave in moments of danger, and possessing to a high degree that military instinct which is so valuable in the loose formations demanded by modern warfare, the Turk forms the beau-ideal of a soldier."—*Journal of the United Service Institution.*




MAP
to illustrate the
TURCO-GREEK
CAMPAIGN IN
THESSALY AND EPIRUS.
English Miles
Railways
Heights in English Feet.
PAXOS
Antipaxos
Gomaros Bay
SANTA MAURA
I?
(LEVKAS)
CEPHALONIA
GULF OF ARTA
ACARNANIA AND ÆT
GULF OF PATRAS
IONIAN SEA
EPIRUS
THESSALY

KAMPANIA
SALONIKA
O N I A
GULF OF SALONIKA
GULF OF CASSANDRA
AEGEAN SEA
H E S S A L Y
GULF OF VOLO
SKIATHOS
SKOPELOS
Trikeri Channel
H H O T I S
AND P H O C I S
ÆTOLIA
ATALANTI CHANNEL
E U B Œ A
ATTICA AND BŒOTIA
GULF OF CORINTH
O R E A
ATHENS
22
23

BOOK NOTICES AND EXCHANGES.

MILITARY MAP READING, FIELD, OUTPOST AND ROAD SKETCHING. Captain William D. Beach, Third Cavalry, Instructor in Military Topography at the United States Infantry and Cavalry School. Hudson-Kimberly Publishing Co., Kansas City, Mo.

The ability to read topographical maps is a requirement that all military men should possess. To simplify the subject to such an extent as to render instruction in it an easy task, without being too general, necessitates a thorough theoretical and practical knowledge that can only be obtained by long experience. That such knowledge is possessed by the author of this book is shown by its contents, especially Part I, devoted to map reading.

In giving instruction to non-commissioned officers one is often at a loss how to begin. The book clearly shows the proper method of proceeding, beginning with *conventional signs*, showing by illustration how each is made and explaining what each represents. Next, the *scale* of a map is concisely explained and made easy of comprehension by illustration. The description of the *compass*, being very important, is well illustrated and carefully, correctly and methodically given.

The almost infinite varieties of form which ground has assumed is treated, in detail, by definition and illustration. The plate shows a perspective view of various features, and also the horizontal projection of the lines cut out by contour planes. The drawing is so clear and so well executed that the merest novice can read, understand and appreciate it.

Contouring, as well as the study of a contoured map, is briefly treated. The methods given are the simplest, and anyone who has attempted to teach this difficult branch of topography will appreciate the simplicity with which it is presented.

Field, outpost and road sketching is treated in sequence, and with sufficient minuteness to make it plain.

The book is an addition to our literature on topography, and all officers who have given instruction in it will appreciate the intelligent effort of the author to simplify and perfect the work in teaching

non-commissioned officers and enlisted men something of map reading and map making.

A page or two devoted to plainscraft and woodscraft might have added to the value of the book.

THE MATABELE CAMPAIGN OF 1896. Colonel Baden-Powell, Thirteenth Hussars, F. R. G. S. Methun & Co., London.

Through the courtesy of the author, the JOURNAL is in receipt of a copy of this most excellent and interesting account of the late operations against the Matabele rebels in South Africa.

In his letter to the Secretary, Colonel Powell says: "I venture to think that it might be of interest to many of your members, since it deals a good deal with the work of cavalry as mounted infantry against savage foes where scouting and rapid, long distance patrols were generally practiced in imitation of those carried out by your cavalry against the Indians."

The surmise of the author as to the interest it would prove to our cavalry officers is a correct one, for seldom is a more interesting and instructive account of such operations found. Those of us who have done any scouting after the wily redskin in the mountains and over the plains of Arizona and New Mexico, will recognize many similarities both as to country and foe. Our English brethren have also the same annoyances in the way of hostile and interfering methods among the people at home, such as press criticisms, peace proclamations, and other forms of interference.

The firearms of the Matabele are rather inferior, apparently, to those used by the American Indian at the present time, being of odd calibers and often of obsolete patterns, more like the style of gun given up by our Indians at the various times when they have surrendered their arms after peace has been proclaimed.

Some of the methods of handling these blacks would hardly be safe if applied to our own warfare, as these foes do not seem to have quite as much watchfulness as ours, allowing a comparatively close inspection of their strongholds, by a numerically weak force, and their stupidity in certain cases would never be displayed by a Sioux or a Cheyenne. Their method of ambushing a very small patrol is quite amusing and very easily circumvented, as they make a wide circuit and lay in wait on the trail by which it approached, never reckoning on the fact that the patrol can return by another; this of course makes it an easy matter for the patrol to circumvent them.

A curious similarity is observable in the name given to the Hotchkiss mountain gun by the Matabele, and by the Crow (and probably other) Indians in our own West. The Matabele call it the "Bye-and-Bye" gun, and the Crows call it "The-gun-that-shoots-to day-and-fires-again-to-morrow."

A. G. H.

HINTS ON STABLE MANAGEMENT. Captain M. F. Rimington, Inniskilling Dragoons. Gale & Polden, Aldershot.

The book contains seventy-two pages of very useful hints on forage, conditioning of horses, watering, grooming, manes and tails, shoeing and feet, ventilation, care of saddles, bitting, marching and camping.

There is little or nothing that is new; but the arrangement is excellent and there is no superfluous matter. Something of the same kind for our service for the use of stable sergeants would be beneficial.

QUESTIONS AND ANSWERS ON THE THEORY AND PRACTICE OF EQUITATION FOR THE COURSE OF SQUADRON TRAINING. Major A. J. R. Van Cortlandt, Third K. O. Hussars. Gale & Polden, Aldershot.

This booklet is not a treatise; as its name implies, it is a series of questions and answers. Like all works of its class it is restricted in its scope, and presents in condensed form much that needs full explanation.

THE SYNCHRONOGRAPH. A NEW METHOD OF RAPIDLY TRANSMITTING INTELLIGENCE BY THE ALTERNATING CURRENTS. By Albert Cushing Crehore and George Owen Squier. Pamphlet form. Technical description and discussion of the instrument. Fully illustrated.

PROCEEDINGS OF THE ROYAL ARTILLERY INSTITUTION. March, April, May, 1897.

1. A Plea for Speed in Firing With Garrison Artillery Guns. 2. The German Method of Bringing Guns into Action. 3. Colonel James Wemyss, Master Gunner of England, 1638–1666. 4. Captain Bogue and the Rocket Brigade. 5. Mountain Artillery Drill, 1837. 6. The British Army on the Continent of Europe. 7. Coast Defense. 8. Röntgen Rays. 9. The Science of Frontier Delimitation. 10. Direct and Indirect Fire. 11. Encampments in Hill Warfare on the Northwest Frontier of India.

JOURNAL OF THE UNITED STATES ARTILLERY. March, April, 1897.

1. Field Shrapnel and the Cannon of the Present. 2. Some Notes on our Artillery Target Practice. 3. An Improved Method of Hauling Heavy Guns. 4. The Progressive Development of the Schools for Artillery Practice in Germany. 5. An Experiment with Militia in Heavy Artillery Work. 6. Report on Development of a Photo Retardograph. 7. Professional Notes. 8. Book Reviews. 9. Index to Correct Artillery Literature.

JOURNAL OF THE MILITARY SERVICE INSTITUTION. May, 1897.

1. Proper Military Instruction. 2. The Present Status of Field Artillery. 3. The National Guard. 4. Developments in Horse-

shoeing. 5. Question of an Artillery Reserve. 6. The Sanitary Sergeant. 7. Ammunition Supply in Foreign Armies. 8. Proposed Uniform Examinations. 9. A Sketching Board. 10. Reprints and Translations. 11. Military Notes. 12. Comment and Criticism. 13. Reviews and Exchanges.

JOURNAL OF THE UNITED SERVICE INSTITUTION OF INDIA. April, 1897.

1. Jungle Warfare. 2. Some Considerations on the Subject of Musketry Fire and Musketry Training. 3. The Encouragement of Fencing. 4. Dueling in the German Universities. 5. Optical Lantern Apparatus. 6. A Portable Weigh-Bridge for Checking Cost Transport Loads. 7. The Military Meaning of Partisan. 8. Foreign Articles.

PROCEEDINGS OF THE UNITED STATES NAVAL INSTITUTE. No. 1. 1897.

1. Prize Essay for 1897: Torpedo-Boat Policy. 2. International Arbitration; How and How Far is it Practicable? 3. Naval Law and Naval Courts. 4. Improvements in Ordnance and Armor in the Recent Past and Future. 5. The Capabilities of the Chart Compass. 6. Torpedo-Boat Policy. 7. The Composition of the Fleet. 8. Professional Notes. 9. Book Notices. 10. Bibliographic Notes.

THE INDIAN FENCING REVIEW. Nos. 2 and 3.

1. The Indian Fencing Association. 2. The Infantry Sword Exercise of 1895. 3. Sword Fighting and Sword Play. 4. Foreign System of Military Fence. 5. Fencing Journeys. 6. Massiello at Aldershot. 7. Fencing Journeys in Italy. 8. Swordsmanship in the Russian Cavalry. 9. Skobeleff on Cavalry Armament. 10. Cuts and Points. 11. Books of Fence.

THE CANADIAN MILITARY INSTITUTE. March, 1897.

1. The Fundamental Principles Underlying the Battle Tactics of the Different Arms. 2. The Administrative System of a British Regiment. 3. Fire Discipline. 4. The Afghan War with the Khyber Column under Sir S. J. Browne. 5. The Strategic Value of Canadian Railways. 6. The Best Mode of Enlisting and Training a City Corps. 7. Reprints.

THE MAINE BUGLE. April, 1897.

1. The Tenth New York Cavalry. 2. Buckland Mills. 3. The Fourth Regiment of Carolina Confederate Infantry. 4. The Flag of the Sixty-First. 5. First Maine Heavy Artillery in the Fall of 1864. 6. Two Brothers in Blue. 7. The Capture of Fort Fisher, North Carolina. 8. General Adelbert Ames. 9. Echoes.

JOURNAL OF THE ROYAL UNITED SERVICE INSTITUTION. May, 1897.

1. Major William Norman Ramsey. 2. Second Prize Essay. 3. The National Study of Military History. 4. Obok and the Country Bordering on the Gulf of Tajuro. 5. Naval Notes. 6. Military Notes.

THE UNITED SERVICE. April, 1897.

1. Washington as a Soldier. 2. The Indian Mutiny in Fiction. 3. Mr. Blakely's Boomerang. 4. The Yacht "Gnome." 5. Conversational Arithmetic. 6. Service Salad.

ALDERSHOT MILITARY SOCIETY. March, 1897.

Tactical Application of Field Defenses in Battles of Recent Campaigns.

REVUE DU CERCLE MILITAIRE.

IOWA HISTORICAL RECORD.

MILITAER WOCHENBLATT.

THE BREEDERS' GAZETTE.

THE RIDER AND DRIVER.

OUR DUMB ANIMALS.

PRIZE ESSAY.

I.

At a special meeting of the Executive Council of the Cavalry Association, held March 8th, to consider the subject of a prize essay, the following resolution was adopted:

Resolved, That the Cavalry Association undertake the production of a history of the American cavalry, which shall be brought out in the form of a series of historical essays, to be published in the JOURNAL; to this end be it further

Resolved, That the Cavalry Association does hereby offer a prize of $100.00 in cash for the first essay of the series.

The prize will be awarded under the following conditions:

1. The competition to be open to all persons.

2. The essays must not exceed 30,000 words.

3. Three typewritten copies of each essay will be sent in a sealed envelope to the Secretary on or before October 15, 1897.

4. The essay will be signed *only* with the *nom de plume* adopted by the author. A sealed envelope bearing the *nom de plume* on the outside, and enclosing full name and address, must accompany the essay. This envelope will be opened in the presence of the Council after the decision of the Board of Award has been made.

5. The successful essay shall become the unconditional property of the Cavalry Association, and will be published in the CAVALRY JOURNAL.

6. The second essay shall receive honorable mention, and if desired by the Council, shall, upon payment of $25.00 to the writer, become the unconditional property of the Cavalry Association.

7. The prize shall be awarded upon the recommendation of a Board, consisting of three suitable persons chosen by the Executive

Council, who shall be requested to designate *the essay deemed worthy of the prize*, and also, *the essay deemed worthy of honorable mention.*

Should members of the Board determine that no essay is worthy of the prize, they may designate one deemed worthy of honorable mention. Should the Board deem proper, it may recommend neither prize nor honorable mention.

The recommendations of individual members of the Board will be considered by the Council as strictly confidential.

In determining the essay worthy of the prize the Board will consider, *first*, historical accuracy; *second*, professional excellence; *third*, literary merit.

II.

The subject selected by the Council for the first essay of the series is as follows: "The History of the Cavalry of the Army of the Potomac, Including that of the Army of Virginia (Pope's) and also the History of the Operations of the Federal Cavalry in West Virginia During the War."*

III.

The names of the Board of Award will be announced in the September issue of the JOURNAL.

At a special meeting of the Executive Council held June 9, 1897, the following resolution was adopted:

WHEREAS, Many members of the Cavalry Association have expressed the opinion that the time allotted was insufficient for the proper preparation of an essay on the subject announced, particularly at this season of the year; be it therefore

Resolved, That the date for the submission of the prize essays be changed from October 15, 1897, to January 15, 1898; also, that the publication of the names of the members of the Board of Award be deferred until the December issue of the JOURNAL.

E. L. PHILLIPS,
Second Lieutenant, Sixth Cavalry,
Secretary.

*NOTE.—The subject is intended to include organization, armament, equipment and supply, as well as the operations of the cavalry.

THE UNITED STATES CAVALRY.

FIRST CAVALRY—COLONEL ABRAHAM K. ARNOLD.
Adjutant, W. S. SCOTT. Quartermaster, G. H. MACDONALD.
HEADQUARTERS, FORT RILEY, KANSAS.
Troops—*F* and *K*, Fort Riley, Kan.; *A* and *I*, Fort Huachuca, Ariz.; *E* and *H*, Fort Still, O. T.; *B* and *D*, Fort Reno, O. T.; *C* and *G*, Fort Sheridan, Ill.

SECOND CAVALRY—COLONEL GEORGE G. HUNTT.
Adjutant, R. E. L. MICHIE. Quartermaster, H. H. SARGENT.
HEADQUARTERS, FORT WINGATE, N. M.
Troops—*E* and *K*, Fort Wingate, N. M.; *A*, *C*, *D*, *F*, *G* and *H*, Fort Riley, Kan.; *B* and *I*, Fort Logan, Colo.

THIRD CAVALRY—COLONEL (Unassigned).
Adjutant, T. R. RIVERS. Quartermaster, J. W. HEARD.
HEADQUARTERS, FORT ETHAN ALLEN, VT.
Troops—*A*, *B*, *D*, *H*, *I* and *K*, Jefferson Barracks, Mo.; *C*, *E*, *F* and *G*, Fort Ethan Allen, Vt.

FOURTH CAVALRY—COLONEL CHARLES E. COMPTON.
Adjutant, C. STEWART. Quartermaster ——
HEADQUARTERS, FORT WALLA WALLA, WASH.
Troops—*A* and *G*, Fort Walla Walla, Wash.; *E*, Vancouver Barracks, Wash.; *F*, Boise Barracks, Idaho; *B*, *C*, *I* and *K*, Presidio of San Francisco, Cal.; *D* and *H*, Fort Yellowstone, Wyo.

FIFTH CAVALRY—COLONEL (Unassigned).
Adjutant, J. M. JENKINS. Quartermaster, J. T. HAINES.
HEADQUARTERS, FORT SAM HOUSTON, TEXAS.
Troops—*D*, *E*, *F* and *K*, Fort Sam Houston, Tex.; *B*, Fort McIntosh, Tex.; *C* and *I*, Fort Clark, Tex.; *G*, Fort Brown, Tex.; *H*, Fort Ringgold, Tex.; *A*, Fort Bliss, Tex.

SIXTH CAVALRY—COLONEL SAMUEL S. SUMNER.
Adjutant, R. L. HOWZE. Quartermaster, G. H. SANDS.
HEADQUARTERS, FORT MYER, VA.
Troops—*A*, *E*, *G* and *H*, Fort Myer, Va.; *B*, *C*, *F* and *K*, Fort Leavenworth, Kan.; *D* and *I*, Fort Robinson, Neb.

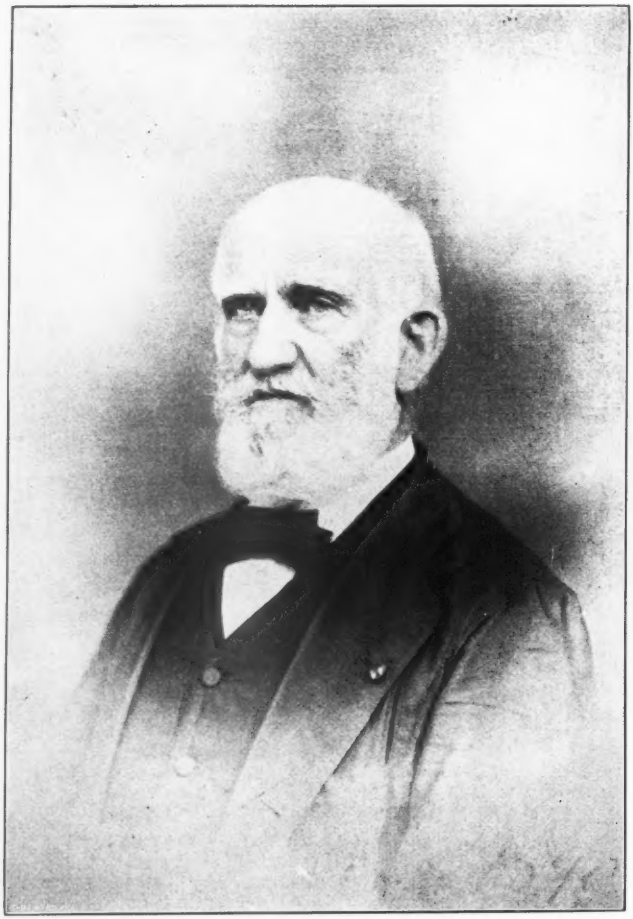
SEVENTH CAVALRY—COLONEL EDWIN V. SUMNER.
Adjutant, W. A. HOLBROOK. Quartermaster, W. H. HART.
HEADQUARTERS, FORT GRANT, ARIZONA.
Troops—*B*, *C*, *E* and *F*, Fort Grant, Ariz.; *I* and *K*, Fort Huachuca, Ariz.; *L*, Fort Sill, O. T.; *A* and *D*, Fort Bayard, N. M.; *G* and *H*, Fort Apache, Ariz.

EIGHTH CAVALRY—COLONEL (Unassigned).
Adjutant, S. L. H. SLOCUM. Quartermaster, C. C. WALCUTT.
HEADQUARTERS, FORT MEADE, S. D.
Troops—*B*, *D*, *E*, *F*, *G*, *H*, *I* and *K*, Fort Meade, S. D.; *A*, Fort Keogh, Mont.; *C*, Fort Yates, N. D.

NINTH CAVALRY—COLONEL DAVID PERRY.
Adjutant. —— Quartermaster, A. B. JACKSON.
HEADQUARTERS, FORT ROBINSON, NEB.
Troops—*A*, *C*, *E*, *G*, *H* and *K*, Fort Robinson, Neb.; *B* and *F*, Fort Du Chesne, Utah; *D* and *I*, Fort Washakie, Wyo.

TENTH CAVALRY—COLONEL (Unassigned).
Adjutant, M. H. BARNUM. Quartermaster, L. HARDEMAN.
HEADQUARTERS, FORT ASSINNIBOINE, MONT.
Troops—*C*, *D*, *F*, *G*, *H* and *I*, Fort Assinniboine, Mont.; *A*, *B*, *E* and *K*, Fort Custer, Mont.

The Adjutants of Regiments will please notify the Editor of changes in the Regimental Staff, and in stations of Troops.



GENERAL A. J. SMITH.